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The Government's Electricity Proposals

THE outline given by the Prime Minister of the Government's proposals in regard to electricity supply has naturally attracted general interest. Further details are awaited before one can estimate the outcome of the scheme, and some years will naturally be needed for its benefits to become apparent. Meantime there are several aspects of importance to those concerned with illumination.

In the first place, there is a good prospect that electricity may be ultimately cheapened considerably. The prospect has been visualized in a far-sighted manner by Sir Hugo Hirst, in an interview granted to "The Observer." By the building of super-stations and interlinking of existing ones, and the economic use of waste sources of power, electricity may well be produced at a smaller cost than at present. It is naturally hardly to be expected that this will "revolutionise costs of production" of manufacturers—in many cases their cost would probably not be very materially affected if they got electricity for nothing!—but nevertheless a lower cost per unit of electricity would be very welcome and lead to its extended use. We hope that one result, at any rate, would be to incline users to make a more generous provision for good illumination; in the lighting field any material diminution in the cost of energy would have a marked effect.

But of even greater importance, to our mind, than the possible cheapening of the commodity is the prospect that ultimately the new arrangements will lead to a great simplification of existing conditions. The wide variations, both in the nature of the supply and the voltage, impose great difficulties on manufacturers of all electrical goods. In London, where so many adjacent areas served by different systems exist, the conditions are particularly inconvenient; lamps and motors installed on one side of a street may be inapplicable on the other side, where a different system or voltage prevails.

To the lamp industry the variety of voltages is particularly troublesome. The multiplicity of voltages puts us at a great disadvantage as compared with the United States, where a graded voltage from 100 to 120 volts applies to 95 per cent of installations. Concentration on a small range of neighbouring voltages would be favourable to standardization and mass-production, with a corresponding gain in efficiency and economy of the manufactured product. We might well expect that under these circumstances lamps and many other forms of electrical apparatus would be both cheaper and better.

We are glad to hear that some of the desired standardizations are receiving careful consideration and may ultimately be realized by friendly co-operation of the parties concerned.

The Lighting of the Home

IN our last issue we referred to the meeting of the Illuminating Engineering Society at the E.L.M.A. Lighting Service Bureau on Dec. 16th, and in the present issue an account of the proceedings is included (pages 5-11). The introductory report summarising progress in electric lamps and lighting appliances contained a number of interesting points, which led to a useful discussion, and the various demonstrations, especially that by Miss Hodge in the model home, were much appreciated. Various opportunities for useful work were suggested—for example, in the lighting of schools, offices, kinema theatres and churches. But the lighting of the home attracted most attention.

This is surely a field where much remains to be done. The good results that followed the recent propaganda in favour of better shop-lighting suggest the desirability of directing attention to the lighting of private houses. It was remarked in the discussion that the public, even now, has not parted with the impression that lighting is primarily a field where economies in bills should be made. Many householders who pay without a murmur what is necessary for the furnishing, decoration and general upkeep of their home are aghast at any expenditure on lighting fittings or even a small increase in their lighting bill, and use the available gas or electricity in the most timid manner. The habit was, we believe, formed in past days when candles and indeed any form of artificial light was regarded as an expensive luxury, only to be used freely on festive occasions. It was probably accentuated by the basis on which improvements in lamps were offered in the early part of this century—the usual incentive offered to purchasers of a new lamp being that it would "reduce his bills." This form of approach has now been replaced by a much more reasonable one—the contention that good lighting in the home is a priceless acquisition that makes all the difference to comfort. But there are many householders who fail to get the best results from the lamps they use, or who are unaware of the possibilities of the latest forms of lamps and lighting units.

There is no field that offers a better object-lesson in matters of lighting. Each room in a house, drawing room, dining room, bedroom, kitchen, etc., presents special problems. A consumer who has grasped the main points in each case will apply the lessons in his vocation.

We do not minimise in any way the importance of other services which gas and electricity can offer, for heating, cooking and other applications, but we do feel that proper lighting is the *first* consideration, and we hope that in the immediate future all undertakings will concentrate their attention on propaganda in favour of better lighting in the home.

"Too Bright to Last"

UNDER this title a case of unscrupulous offering of inferior and apparently over-run lamps which gave "an extraordinarily bright light" when installed, but failed (after the departure of the vendor) within half an hour, is described in the *Evening News*.

Occasional incidents of this kind have occurred throughout the history of the incandescent lamp. The writer can recall that when the metal filament lamp was first introduced, over-run carbon filaments, artfully concealed within a frosted bulb, were offered to the public. Obvious frauds should presumably be less frequent nowadays, when knowledge of illumination is more widely disseminated. But it is an admitted fact that the average consumer, who may show considerable acuteness in the purchase of clothing, grocery or other commodities, has often no knowledge whatever of the nature of the electric lamp and is readily deceived even by a seemingly evident imposture such as that described above.

Indeed, in dealing with lamps that superficially resemble one another and apparently burn normally when first installed, even an expert has to take a great deal on trust; it may only be in the course of weeks or months that latent defects in cheap but inferior lamps reveal themselves. The public has at present two means of protection. If they buy from a maker of repute they can expect lamps of an average good standard quality, and if they happen to get a bad batch, they know who to remonstrate with and obtain a remedy for the mistake, whereas an itinerant vendor of bad lamps cannot usually be found by the time the goods have proved faulty. If they are large buyers they can also avail themselves of the B.E.S.A. standard specification.

The necessity of safeguarding the quality of illuminants was recognized centuries ago. In one of the earliest issues of this journal will be found a summary of the Ordinance of the Wax Chandlers (1358), who imposed a very strict specification. In the Ordinance it was decreed that "all torchyz, cierges, priketz" found to depart from this specification should be burned before the door of the maker, and his body committed to prison. More severe penalties were laid down for subsequent offences.* It is now twenty years since the writer, in an article contributed to *The Times Engineering Supplement* in 1905, urged that lamps tested and found to comply with an accepted specification should be identified with a "hall mark," which it should be an actionable offence to imitate or misuse. In this case it would only be necessary to advise users to confine their purchases to lamps having this guarantee of quality stamped upon them. If an unscrupulous vendor of bad lamps imitated the "hall mark," or used it without justification, he could be prosecuted, and in the long-run even absconding offenders would be tracked down and punished by the ordinary processes of the law. Under present circumstances there is no legal basis of distinction between a good lamp and a bad one and one has to depend upon the honesty and reputation of lampmakers; offenders cannot be brought to book unless misrepresentation can be proved, and this is not always an easy matter.

We understand that the project of applying an official stamp of this description is now being revived in some quarters, and we believe that in the long run it would prove a great safeguard to the public and a legitimate protection to the lamp industry.

* *Illuminating Engineer*, 1909, p. 734.

Light as an Element in the Guidance of Traffic

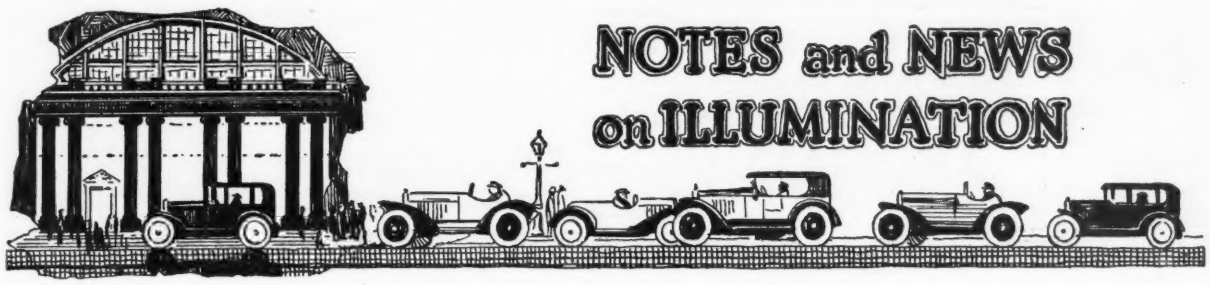
IN the various papers that have been presented dealing with public lighting, reference has almost invariably been made to the continually increasing volume of traffic demanding better lighting than in the past. But it is becoming evident that light plays a part in connection with traffic in other ways. The problem of avoiding glare from motor-car headlights cannot be properly treated without at the same time considering street lighting. One of the most interesting recent suggestions, emanating from the United States, is the use of the "depressed beam," as an alternative to the ordinary driving illumination. This is ingeniously effected by mounting two filaments in the same bulb, one in focus and one out of focus. The latter gives a beam which does not rise above the horizontal but only illuminates the road a short distance ahead. Hence the motorist, when passing an oncoming car, or in well-lighted streets where a powerful beam is unnecessary, can produce the depressed beam, which is comparatively free from glare, by merely operating a switch.

Equally important is the use of luminous devices for the guidance of traffic. In a number of cities in the United States the use of colour-signals to indicate when traffic is to proceed or stop appears to have proved very useful. It is possible that, following Sir Henry Maybury's visit to the States, these methods may be applied in this country. It should be realized that the conditions in many of our cities are somewhat different from those in the States—for instance in the fact of roads being so frequently curved or irregular instead of straight wide avenues. Nevertheless there may be situations where luminous traffic signals will prove of value, either in stopping or permitting vehicles to proceed or in marking out the flow of traffic in the same manner as is now being effected by the stencilled white lines. On page 20 will be found a note on an ingenious device to furnish illuminated white lines, which is now being experimented with at Hendon. We understand that experiments with coloured signals are also to be made in Piccadilly, and for some time "winking" lighthouses at cross roads have been in use on several arterial routes.

In Germany, as an article on page 11 shows, experiments with luminous traffic signals are also being made. Special reference is also made to the important question of providing luminous danger signals at railway level crossings—a point brought to our notice by several recent serious accidents in this country.

All these varied problems, which are likely to become more urgent as time goes on, really need to be considered conjointly with public lighting as a single subject.

In the case of arterial roads between cities the problem of providing artificial light at night is an exceedingly important one, and it is probable that here, too, the need for luminous signs and indications of all kinds connected with night traffic will become more and more realized. All these considerations lead to the conviction, already expressed many years ago by the writer, that public lighting in all its aspects needs to be regarded as a national matter and ultimately cared for by a properly constituted central authority.



The Optical Convention

It is announced that the Optical Convention, announced in our November issue, 1925, is being arranged to take place at the Imperial College of Science, South Kensington, for the week beginning April 12th, 1926.

We understand that a number of papers on photometry, dealing with such matters as incandescent lamp sub-standards, progress in illumination photometers, photo-electric cells, etc., are in prospect, and the proceedings should be of considerable interest to members of the Illuminating Engineering Society.

As previously mentioned, the secretary of the Convention is Mr. Thomas Martin (1, Lowther Gardens, Exhibition Road, London, S.W.7).

Atmospheric Pollution

The eleventh annual report issued by the Committee for the Investigation of Atmospheric Pollution (Meteorological Office, Air Ministry) contains a useful record of observations in the year ending March, 31st, 1925. The automatic recorder has yielded some interesting results in different cities, and the effect of wind in governing the concentration of impurity is dealt with. Some counter-observations in cities abroad are also included. A note on the celebrated fog on December 9th, 1924, is of special interest. Simultaneous tests in London and at Cheam (about 11 miles south-west of London) showed that there were roughly fifty times as much impurity by weight in the London fog and a relatively larger amount of water at Cheam. This seems to suggest that the "London particular" is formed by a replacement of water particles by smoke rather than by the dirtying of condensed water. Owing to the unfortunate illness and subsequent death of Mr. G. M. Watson, the visibility research had to be suspended during the past winter. Some of these problems, such as the loss of daylight, as distinct from sunshine, due to impurity, are of great importance. We are glad to note that it is hoped to resume the experiments during the present winter.

A New Fuel Economy Institution

It is a sign of the times that a new institution has been formed to deal in a scientific manner with the problem of preparing and utilizing our fuel resources with much greater efficiency. This new organization—the Institution of Fuel Economy Engineers—was recently inaugurated at a meeting of experts at the Engineers' Club, London. Among those taking part in the proceedings were Dr. T. Barratt, Professor Bacon, W. C. Goodchild (representing Sir Henry Fowler), Dr. R. Lessing, E. W. L. Nicol, John Bruce, S. W. Bettoney, J. S. Gander, and A. C. Mahar. The first Council was elected, and it was decided to form sections in different parts of the country. The secretary is Mr. H. L. Pirie, and the registered office of the Institution is 29, Sherwin Road, Lenton, Nottingham, pending the opening of London headquarters.

The operations of this new body will be watched with interest. It is to be hoped that its activities will help to check wasteful methods of using fuel, such as result in the pollution of the atmosphere, with its ensuing loss of sunlight and prejudice to health.

Sheffield Illumination Society

We have received the syllabus of the Sheffield Illumination Society for 1926, which includes a number of interesting forthcoming events. On January 21st, Mr. J. M. Moordwood is dealing with "The Making of a Lamp Pillar," and in February Mr. W. T. Wardale lectures on "How Electricity is Supplied to the Tramcars." On March 18th, Mr. George Herbert is giving a talk on lighting, and on April 15th Mr. S. T. S. Musgrove discusses the "Distribution of Gas." Other items on the programme include papers by the Horstmann Gear Co. on "Automatic Control of Street Lighting," and by Mr. G. A. Percival on "Two Thousand Years of Lamps." There are also a number of visits and excursions to local works, etc.

The Formation of an International Federation of the Technical Press

On December 15th Mr. L. Gaster gave an account before the Circle of Scientific, Technical, and Trade Journalists of the Congress in Paris, leading up to the formation of this Federation, which was dealt with in our issue of October, 1925. The matter is one of considerable interest to the technical press in this country, and there was a good discussion. A number of those present signified their intention of joining, and thus forming a nucleus of technical journalists representative of this country.

Flood-lighting Shakespeare's Statue

In connection with the introduction of "Henry VIII" at the Empire, an interesting departure has been suggested—the flood-lighting of the statue of Shakespeare in the centre of Leicester Square. Probably many people are unaware of the existence of this statue, and its illumination during the revival of one of Shakespeare's most popular plays would be an appropriate expedient. The chief point to be determined will be the finding of a suitable site for the projector.

Department of Scientific and Industrial Research

Physical and Chemical Survey of the National Coal Resources

In pursuance of the policy of carrying out work on the above subject, which is one of the main aspects of the Fuel Research work of the Department of Scientific and Industrial Research, a committee has been appointed to deal with the physical and chemical survey of the coalfields of Scotland.

The composition of the committee is as follows:—

Representing the coalowners of Scotland:—

Ayrshire Coal Miners' Association—Mr. M. Brand.

Lanarkshire Coal Masters' Association—Mr. R. Forrester, Mr. W. Thorneycroft, and Mr. J. Robertson.

Fife and Clackmannan Coalowners' Association—Mr. C. A. Carlow.

Lothian Coalowners' Association—Mr. J. Clark.

Representing the Mining Institute of Scotland:—

Professor R. W. Dron, Professor T. Gray, Mr. M. Macgregor (Assistant Director for Scotland, Geological Survey), Dr. C. H. Lander, *ex officio* (Director of Fuel Research), Mr. F. S. Sinnatt (Superintendent of the Physical and Chemical Survey of the National Coal Resources).

Committees are already established in the Lancashire and Cheshire, South Yorkshire, and North Staffordshire areas.

Ultra-Violet Radiation from Electric Incandescent Lamps

From time to time references have been made to the presence of ultra-violet energy in the spectrum of gas-filled electric lamps, but hitherto little definite information on this point has been published, though it has been conjectured that the amount is small. It is, therefore, of great interest to note in a recent summary of researches presented before the Société Française des Electriciens a note by Professor Ch. Fabry on this subject. Diagrams comparing the distribution of radiation by the sun and the tungsten filament suggest that the amount of ultra-violet energy from the latter is minute. Even when the radiation curves are drawn on the basis of equal flux of light, the disparity is very great; in fact, the ultra-violet radiation of wavelength less than 300$\mu\mu$ (with which possible ill-effects are supposed to be mainly associated) present, even in the incandescent lamp richest in this form of energy, is estimated to be only 2-3 millionths of the visible energy. In the case of the sun, as is well known, the amount of ultra-violet energy is much diminished by the passage of the light through the atmosphere. The glass bulbs of electric lamps have a similar absorbing effect. Curiously enough, bulbs seem to differ considerably in this respect; thus, for one specimen of bulb there was apparently actually more of the very short-wave radiation (for equal illuminous flux) than by solar light, whereas for other bulbs there was far less. This seems to suggest that the quality of glass used for bulbs is worth looking into—especially in the case of high candle-power lamps used for photographic work. It should not, however, be assumed that for ordinary practical purposes the entire exclusion of ultra-violet rays is necessarily a benefit. On the contrary the members of the medical profession have recently stigmatized the absorption of ultra-violet light by the smoky atmosphere of cities as a drawback to health.

Improvements in Projector Lamps

In the United States portable cinema outfits of the "suit-case" type appear to be very popular, and in the Journal of the American Institute of Electrical Engineers reference is made to several recent improvements. The size of lamp used is determined largely by considerations of space available, but it has now been found possible to incorporate a 500-watt lamp instead of a 400-watt lamp of the same dimensions. In addition, lamps are run at a higher efficiency, with a 50-hour life instead of the old 100-hour rating, and the combined effect is to increase the screen-illumination by a third. New methods of arranging the filament of the 1,000-watt 110-volt lamp for semi-portable equipments have also led to a 15-20 per cent. increase in screen-brightness. On the other hand, the life of the round-bulb concentrated filament lamps designed for spotlight service has been increased from 100 to 200 hours rated average. The conditions of service of such lamps are quite different from those used for projectors, and it is necessary to distinguish between the two designs; similarly the round-bulb lamps used for spot-light service should not be confused with lamps of similar rating intended for flood-lighting, which are run at a lower efficiency and have a life of 800 hours.

Lectures on Illuminating Engineering in Germany

In view of the special coures of lectures arranged at the Polytechnic (Regent Street, London), under the auspices of the Illuminating Engineering Society last year, and the lectures and demonstrations being given by the E.L.M.A. Lighting Service Bureau, it is interesting to observe that a special course has now been arranged to take place at the Osram-Lichthaus in Berlin. The course is under the joint auspices of the German Illuminating Engineering Society and the Vereinigung der Elektrizitätswerke, and is intended specially for the benefit of the staffs of electric supply undertakings. In a preliminary notice in *Licht und Lampe* the view is expressed that the time is now ripe for wider dissemination of information on good lighting. The course is to extend over four days, and comprises 15 lectures dealing with all the main aspects of illumination. The lecturers include Dr. L. Bloch (President of the Illuminating Engineering Society in Germany), Professor Dr. J. Teichmüller, Herr P. Heyck, Dr. H. Lux, and other leading members of the German Illuminating Engineering Society whose names are well known in this country. The subjects include: Fundamental Principles, the Measurement of Light and Illumination, Globes, Shades and Reflectors, Calculations and planning of Lighting Installations, the Lighting of Offices, Streets and Factories, Domestic Lighting, Shop-window Lighting, Illuminated Signs, etc. There will also be demonstrations of the use of illumination-photometers and methods of laying out installations, a visit to a lamp factory, and to the "Bawag" demonstration hall, and a visit of inspection of street lighting and shop-window and advertisement lighting in Berlin.

The Testing of Reflectors for Automobile Headlights

The rapid development of the motor-car has led to a modification in methods of producing the parabolic reflectors which form the basis of most headlights. Formerly these were usually spun, and fairly accurate results were obtained in this way. However, the use of presses, which is now customary, gives considerably greater uniformity, and it is interesting to ascertain by optical tests the degree of reproducibility. Mons. A. Marsat, in a contribution to the Société Française des Electriciens, describes two methods of determining want of symmetry about the optic axis. In the first of these a lamp with a short line filament is moved gradually across the axis in a vertical plane passing through the focus of the reflector. In its correct position it should then give uniform brightness of beam, when the latter is projected on to a screen at a convenient distance. Divergence of the filament from the theoretically correct spot should give a central dark area. Many of the reflectors thus examined showed an aberration of less than 1 mm.; others, however, showed 8 to 10 mm. aberration, and it is evident that this would considerably affect the beam in practice. Some forms of headlights, having a fixed holder for the lamp, cannot be conveniently tested in this way. Mons. Marsat has dealt with these cases by using a series of three control lamps specially made with filaments which (*a*) are bisected by the optic axis, (*b*) fall just above it, and (*c*) fall just below it. Examination of the central region of the beam, when these three lamps are inserted in succession, serves as an equally useful test of the accuracy with which the reflector is formed.

TECHNICAL SECTION

COMPRISING

Transactions of The Illuminating Engineering Society and Special Articles

The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

Progress in Electric Lamps and Lighting Appliances

(Proceedings at the meeting of the Society held at the E.L.M.A. Lighting Service Bureau, 15, Savoy Street, Strand, London, W.C., at 7 p.m. on Wednesday, December 16th, 1925.)

BY kind invitation of the E.L.M.A., a meeting of the Society was held at the Lighting Service Bureau (15, Savoy Street, London, W.C.), at 7 p.m. on December 16th, 1925, Mr. C. W. SULLY, Director of the E.L.M.A., presiding.

The minutes of the last meeting having been taken as read, the HON. SECRETARY read out again the names of applicants presented at the last meeting, and these gentlemen were formally declared members of the Society.*

The report prepared by the Committee on Progress in Electric Lamps and Lighting Appliances was then read by Mr. C. Hughes, in the absence of Mr. S. H. Callow (Chairman of the Committee), and was as follows:—

Progress in Electric Lamps and Lighting Appliances

(Report of the Committee on Progress in Electric Lamps and Lighting Appliances [Mr. S. H. Callow (Chairman), Mr. C. W. Sully, Mr. J. W. Elliott (Secretary), Mr. J. Y. Fletcher.])

GENERAL.

The past year has witnessed a considerable consolidation of the progress made in previous years and a greater co-operation between electric lighting interests, which has helped to improve the standards of electric lamps and lighting equipment. It can confidently be stated that never before has it been possible to provide better facilities for artificial lighting. Due to this close co-operation there has been a steady appreciation on the part of the public in regard to the value of good illumination in industry, commerce and the home.

ELECTRIC LAMPS.

During the period under review there have been no fundamental changes in electric lamp design, although many improvements in manufacture and efficiency have been made. Pipless lamps are now almost universal, and have found great favour with the public. Manufacturers are now working very closely to the limits defined in B.E.S.A. Specification No. 161, and there is every anticipation that, as a result of improved methods of manufacture, the time is not far distant when even closer tolerances can be adopted. White-sprayed lamps and lamps with white opal bulbs are being sold in ever-increasing quantities, since they have been found to form a ready method of partially combating glare. The demand for colour-sprayed lamps has increased considerably, and these are in use for both interior and exterior decorative purposes.

B.E.S.A. SPECIFICATION.

B.E.S.A. Specification No. 161 has been supplemented with a schedule for traction vacuum-type lamps (series burning) and train lighting lamps. This enables such lamps to be defined for dimensions, initial rating and life performance, resulting in improved facilities for the manufacturers and ensuring better service to the users.

* *Illum. Eng.*, Dec., 1925, p. 325.

STREET LIGHTING.

Still further attention has been given to the question of street lighting, particularly in view of the considerable increase in accidents that has ensued during the past year. The Association of Street Lighting Superintendents held their second annual convention in Leeds during September, the outstanding feature of which was the illumination of the streets by all modern types of street-lighting equipment. It was possible for those responsible for street lighting to inspect in a practical manner the effectiveness of different types of installations.

There have been a few new street-lighting fittings introduced. The method of light controlled by refraction appears still to predominate, although a new system has been introduced employing a series of mirrored reflectors which give a multi-image of the lamp. Another unit designed to give a longitudinal distribution has been introduced, particularly for use on highways. Street-lighting engineers are beginning to appreciate that the psychological aspects of street lighting are of almost equal importance as efficient distribution.

INDUSTRIAL LIGHTING.

There has been a steady increase in the intensity of illumination used in factories and workshops. This point was emphasized in the current report of H.M. Inspector of Factories. Factory executives are more appreciative of the fact that light is an important tool, and also that illumination has considerable psychological effect on the workers, and at the same time has a definite economic effect on output. A specification has been issued by the British Engineering Standards Association, No. 232, 1925, in connection with standard dispersive vitreous-enamelled reflectors. This specification defines dimensions, luminous efficiency and light distribution.

SHOP-WINDOW LIGHTING.

There has been a marked improvement during the year in the illumination of shop windows, particularly in the main shopping thoroughfares. Although exposed light sources still predominate to a large extent, this now applies principally to side streets and suburban areas. The intensity of illumination used in shop windows of better-class premises has very considerably increased, 100 watts per foot run now being quite common. One outstanding installation in London is fitted with 500-watt lamps in special reflectors on every two feet of shop front.

During the early part of the year a survey was conducted on 800 retail shops, which indicated that about two-thirds of shop-lighting installations required modernizing. The use of colour, spotlights and floodlights has increased, and, in one or two instances, effective displays have been made by employing colour-sprayed lamps.

Pageant Lighting.

A Military Tattoo produced in connection with the British Empire Exhibition, 1925, relied for its principal features on the use of artificial electric light, and has been described as the most wonderful pageant which has ever been produced in the world. The arena was flooded alternately by means of military searchlights and gas-filled lamps in specially designed angle reflectors, colour being introduced by means of gelatine colour screens of special construction. Tableaux and certain features were illuminated by means of stage-lighting equipment designed for outdoor use. Original effects were introduced by providing the military personnel with electric hand-lamps, which enabled their evolutions, when the ground was in darkness, to give a spectacular display.

Seaside Decorative Lighting.

Colour-sprayed lamps have been adopted almost universally for decorative lighting, particularly at seaside resorts, for the illumination of piers, bandstands, pleasure gardens and amusement parks. There is a tendency in these displays to carefully grade the colours of the lamps which are employed, instead of mixing them indiscriminately, as was common practice a few years ago. Edison screw caps are principally used, due to the fact that the E.S. holders can be more readily designed to withstand moisture and rain.

Electric Signs.

Many original animated signs have been installed during the year, the outstanding example of this type being a sign on the south side of the River Thames, which covers an area of 5,000 square feet, and weighs upwards of 60 tons. The loading of this sign is approximately 100 kw., the total number of lamps used being over 4,000.

The adoption of neon tubes for signs has made considerable progress, two installations of note being a large sign approximately 120 feet square, and a theatre which has its principal architectural features outlined. New types of signs have been introduced which have good advertising value both by day and night. These contain standard electric lamps, and depend essentially for visibility upon the reflection from coloured interior surfaces.

Church Lighting.

There has been a steady application of concealed methods for the illumination of church interiors, many adopting standard commercial reflectors and projectors.

Home Lighting.

It is significant that the majority of new houses which have been built during the year have been wired for electric light, and many thousands of older properties have been converted. The white gas-filled lamp has found great favour for domestic use, and colour-sprayed lamps are used in many cases.

A number of electrical supply undertakings during the year have instituted schemes of deferred payment for wiring of houses. In one small town, which during 20 years had amassed 3,454 consumers, a hire purchase scheme has brought an additional 9,000 consumers in seven months.

The British Empire Exhibition, 1925.

A new lighting scheme was prepared by the E.L.M.A. Lighting Service Bureau, in conjunction with the consulting engineers, for this year's exhibition. Radical changes were made in the more important parts of the grounds, the principal feature being the illumination of Kingsway, where 60 corona standards were installed, each containing 20 100-watt yellow-sprayed lamps, which produce a golden-coloured light throughout Kingsway. Illuminated steam jets on the tops of the buildings, flood-lighting in colour behind colonnades, and illuminated birds, animals and floating devices on the lake caused considerable comment from the visitors. A battery of military searchlights provided with colour screens formed a striking background to the lighting display. Two large columns, each containing 15 neon tubes, were used for the illumination of the two main entrances. Thousands of colour-sprayed lamps were employed for outlining the architectural features of the principal buildings.

Incorporated Municipal Electrical Association's Convention.

In connection with the annual convention of this Association a special display of flood-lighting was made on the eastern façade of the Pavilion to illuminate the oriental architecture. In this instance carefully selected coloured beams were directed on to the building from projectors erected on the lawns. The minarets were illuminated by means of concentrating projectors fitted with projector lamps. In the exhibition adjoining the conference hall a model window was installed where changing colour effects, controlled by means of special switchgear, introduced new possibilities in colour lighting for window display. Several such installations have since been installed in actual shop windows in different parts of the country.

Enterprise of Electrical Retailers.

There has been a marked activity on the part of electrical retailers toward the development of better lighting. Many demonstrations and lectures, organized by the co-operative efforts of electrical retailers, have taken place in different parts of the country with beneficial effects to both the consumers and the organizers.

E.L.M.A. Lighting Service Bureau.

The Lighting Service Bureau of the Electric Lamp Manufacturers' Association has carried on its programme of educational work with increased vigour. Lectures and demonstrations on illumination have been presented both in London and the Provinces to a large number of audiences. A feature of the year's work has been the institution of Illumination Design Courses for members of the electrical trade. In all ten such lecture courses, each of four days' duration, have taken place in London and the Provinces, and, in all, some 500 electrical engineers have attended.

A national campaign for better shop lighting has been inaugurated during the autumn and winter months. In connection with this, standard textbooks on shop and shop-window lighting have been distributed, booklets circulated direct to the shopkeeper, and lecture demonstrations given to shopkeepers both in London and the Provinces. The main lecture room at the Bureau has been converted into a model shop, and many Chambers of Trade, etc., have already attended lighting demonstrations under practical conditions. In order to stimulate interest in the important question of home lighting a revolving house has been built, enabling the various phases of good home lighting to be adequately presented.

Provincial Lighting Service Bureau.

In order to stimulate interest in modern electric lighting, demonstration rooms have been set up to serve the North-East Area and Scotland. These institutions are financed and controlled, principally, by the local electrical interests. Each Bureau is administered by a trained lighting specialist, who gives lectures and demonstrations to all classes of the community in these districts. Negotiations are taking place with a view to opening similar organizations in other large centres in the country.

Electrical Showrooms.

It is interesting to record that several electrical showrooms have been opened by supply undertakings during the year. In addition to the conventional display of electric-lighting equipment, many of these showrooms have been so arranged that illumination effects can be demonstrated in addition to the fittings and lamps.

Demonstrations of Shop-Lighting

Mr. W. E. Bush then gave a demonstration of the shop-lighting equipment which has been assembled at the E.L.M.A. Lighting Service Bureau in connection with recent lectures to merchants, members of Chambers of

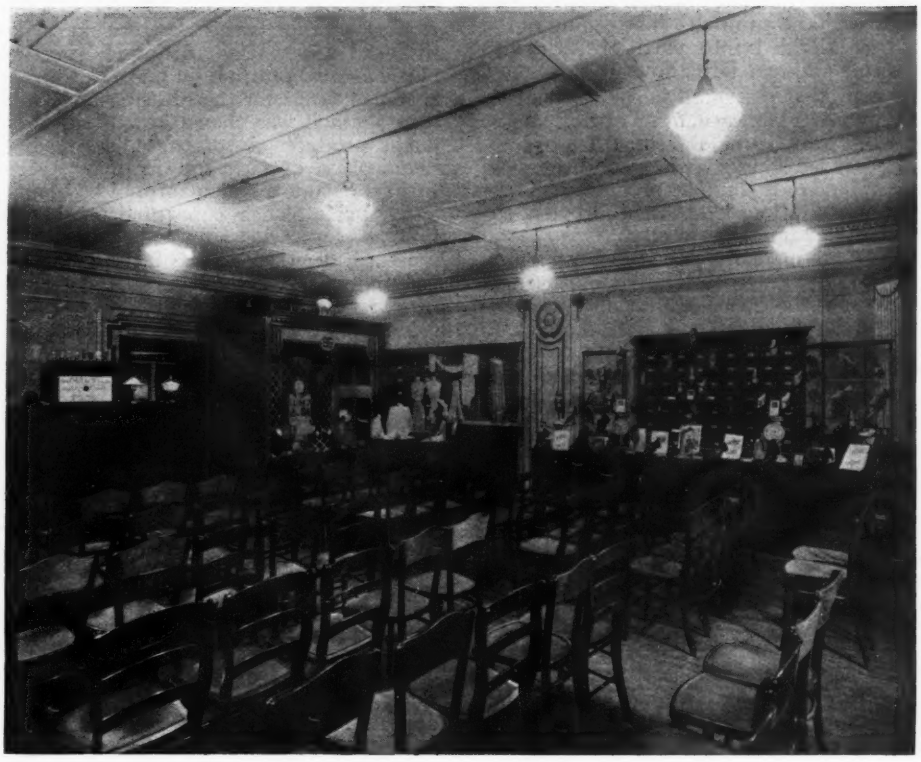


FIG. 1.—View of the Hall of the E.L.M.A. Lighting Service Bureau, showing Model Shop-Counter at side of room.

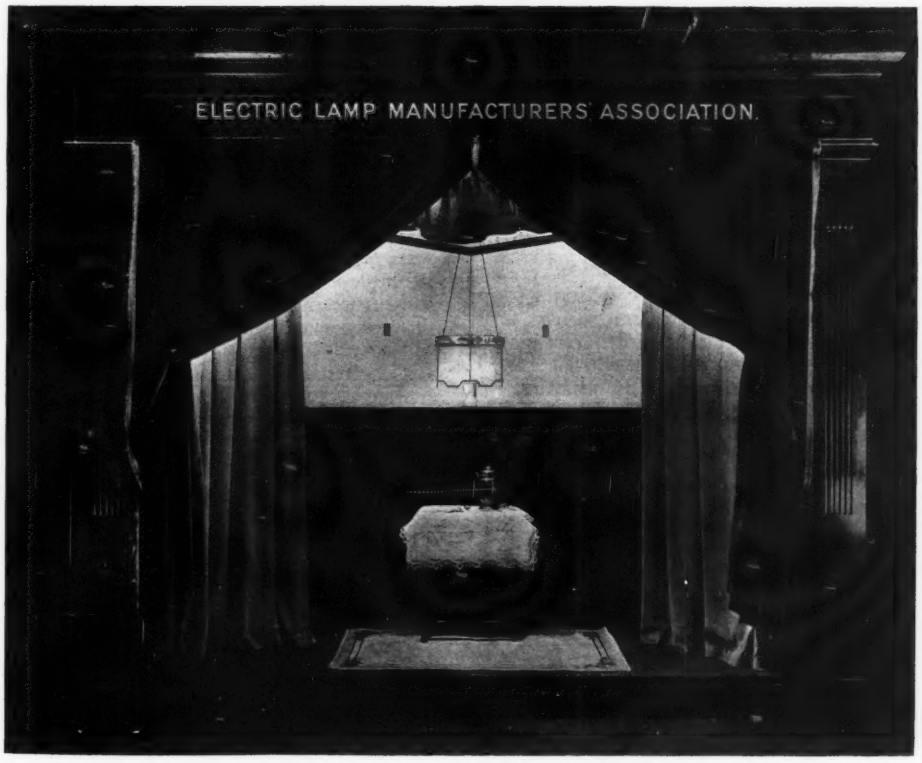


FIG. 2.—Showing the Revolving Model "House" in which demonstrations of domestic lighting are given.

Commerce, display men, etc. As previously described in this journal,* the lecture hall has been equipped with model shop-counters running down the sides of the room, and supplied with actual dummies of well-known forms of goods shown by well-known firms. The ceiling of the room has also been divided into partitions, through which various lighting units can be let down in succession.

Mr. Bush first exhibited the conditions characteristic of obsolete pendants carrying vacuum or carbon lamps, inefficiently shaded. Next a single gasfilled lamp, completely unshaded, was let down. This naturally gave a bright illumination, but crude shadows and glare. These two preliminary demonstrations led to the third step, the use of gasfilled lamps in modern enclosed diffusing glassware, now widely used in many of the largest stores. By means of dimmers in the circuit the illumination was increased progressively, the cheerful effect and commercial value of the bright illumination being pointed out. Other similar units, but equipped with "daylight" lamps, were also shown, as an indication of methods that might be employed in stores where correct matching of colours is of importance. Good and bad methods of shop-lighting were also contrasted by the aid of a small box-model, representing a window, in which concealed lighting and the use of unscreened filaments amongst the goods could be contrasted. Visitors had also an opportunity of inspecting the series of model windows, also described in our October number. It will be recalled that one of these was devoted to an attractive display, with concealed lighting, of a "Pears' Soap" exhibit, whilst another window was specially designed to illustrate the effect of coloured spot-lighting.

Domestic Lighting

The visitors then passed into an adjacent room, where a demonstration of Domestic Lighting was given by Miss F. HODGE. The arrangement of this exhibit was remarkably ingenious. Behind a movable curtain a model electric home has been arranged in sections, mounted on a rotating platform so that each section can be brought successively into view (if necessary one scene being prepared whilst another is being exhibited).

The turntable is 10 ft. in diameter, and is divided into four equal sections by means of partitions set at 90° to each other, and running outwards to the circumference from a central vertical post. Corresponding to the turntable is a movable ceiling. The centre-post and partitions attached to it are divided into two, so that the upper and lower halves may be rotated independently. Outlets are provided in the ceiling and at suitable points on the partitions, so that the appropriate fittings may be attached. A proscenium hides from the spectator all but the section under discussion.

The working of the arrangement in practice will be understood from an account of changes witnessed.

The first scene was a dining-room. The ordinary form of pendant fitting with bare lamps was first shown, and its defects pointed out. Next, by a quick change, a modern form of shaded unit equipped with white-sprayed lamps was substituted. The improved illumination on the table, and the softer light, free from unpleasing shadows, was pointed out, and it was also shown how this form of unit can also be used to illuminate the ceiling and surroundings—the diffusing coating over the lamps preventing unsightly shadow line on the wall. It was likewise shown how, if desired, such indirect lighting of the upper parts of the room can be combined with the local light of a well-shaded table lamp. It should be mentioned that the fittings in these model rooms are all equipped with a "catch-plate" connection, so that they can be removed bodily and expeditiously and another substituted. Thus only a very short interval is necessary whilst the curtain is lowered and the change made.

In changing the fittings in the same room, as in the demonstration described above, it is only necessary to revolve the upper half of the partition, bringing new types of fittings into view (the lights being extinguished or the curtain dropped whilst this movement is being made).

* October, 1925, pp. 278-280.

The next item, involving a change from the sitting-room to a bedroom, required that the lower partition should also be moved, and the turntable therefore set in operation.

Miss Hodge was next seen in a model bedroom equipped with various fittings. The drawbacks of the old-fashioned centre light and the conventional forms of shaded fittings for the dressing-table were pointed out; here again it was shown how the use of white-sprayed lamps produces a soft light desirable for the proper illumination of face and figure at the mirror. Other fittings include a simple form of bed-lamp, well screened and capable of being mounted on the bedrail, and fed from a plug-socket at the bedside. In the kitchen a practical demonstration of the drawbacks of obsolete lighting units was shown in the same way. It was seen, for example, how the single drop-pendant gives insufficient illumination, and how a worker with an iron or other implement is apt to be constantly troubled by the shadows cast by the body. A great improvement was effected by a simply enclosed diffusing unit mounted direct on the ceiling, aided by a local unit, employing a white-sprayed lamp, mounted over the table.

Finally, in the drawing-room, several convenient forms of fittings were shown, and the possibilities of combining pleasing and artistic effects with ample illumination were demonstrated.

Discussion

Mr. L. GASTER, in opening the discussion, expressed the thanks of the Society to the E.L.M.A. for their hospitality, and alluded to the interesting demonstrations that they had witnessed. He felt sure that such appeals to the eye formed a most valuable method of impressing on the public the benefits of good illumination. Miss Hodge's demonstration in the ingeniously contrived model house has been very effective; domestic lighting offered many points for discussion, and he suggested that an opportunity of dealing with these in greater detail should be provided by the Society in the near future.

The report read by Mr. Hughes contained a good general survey of progress in electric lighting. Great importance was to be attached to the work of the B.E.S.A. Committee in regard to standard specifications for lamps; the representative nature of the Committee, on which lamp makers, large consumers such as Government Departments, and experts on illumination co-operated, had enabled most useful results to be obtained. He might mention that there were several other committees of the B.E.S.A. engaged in considering other aspects of standardization, for example, in connection with portable photometers, street lighting, glassware and reflectors, etc. It was to be expected that valuable information on the intensity of illumination and lighting conditions requisite for various industrial processes would shortly be forthcoming from the Committee on Illumination working under the Department for Scientific and Industrial Research, to which numerous problems suggested by different Government Departments were also referred. It was proposed that the work of this and the B.E.S.A. committees, about which more should be known, should be outlined at forthcoming meetings of the Society.

He noticed that the Report contained a reference to the exhibit of street lighting arranged by the Institution of Public Lighting Engineers in September. It had given him great pleasure to be present at this conference; he would like to suggest, however, that at a future occasion more time should be allotted to the exhibit, so as to enable conditions of public lighting to be properly examined.

The report had served to illustrate the growth of public interest in illumination, and he was glad to note that several electrical undertakings had shown enterprise in arranging demonstrations and showrooms. There was, however, a general recognition that supply undertakings would do well to pay much more attention to illuminating engineering than in the past. In order to illustrate this point, Mr. Gaster referred to extensive

propaganda undertaken in the United States, and the manner in which lamp manufacturers and supply undertakings in that country co-operated in approaching the public.

Capt. W. J. LIBERTY (Hon. Secretary of the Institution of Public Lighting Engineers) expressed appreciation of the interesting demonstrations that they had seen. With regard to the lighting demonstration at Leeds, to which Mr. Gaster had referred, there had perhaps been an effort to show too much in the time available. He had, however, taken note of Mr. Gaster's suggestion, and in future special efforts would be made to carry out the demonstrations in the most convenient way and enable visitors to form their impressions and get all the information they desired.

Mr. C. HAYES referred to the importance of demonstrations of show-window lighting. Although there had been considerable progress, instances of the misuse of light were still too frequent. As an instance he mentioned the extravagant lighting of a window in Oxford Street; the wattage was excessive, and the eye was attracted by the exposed lamps rather than by the illuminated goods.

Mr. H. F. SIMON regretted that no mention was made in the report about office lighting, a branch of illuminating in which he was specially interested. In the opinion of many it was a matter of the very greatest importance. He had recently had the good luck to get an article published in *The Chamber of Commerce Journal*, in which he had dealt with the importance of good lighting, ventilation, and cleanliness in relation to commerce. It would probably surprise the majority of the employers of clerical labour to learn that the commercial clerk was engaged in one of the less healthy occupations, and that he came 129th on the list.

At the conclusion of the article he had stated that if careful attention was paid to the question the benefit resulting would justify the outlay on the introduction of modern methods and appliances. It was a thoroughly sound financial investment. He was very keen on the subject being considered from the ethical point of view. Some of the richest concerns allowed their employees to work under very bad lighting conditions, and there was an enormous field for improvement. He hoped that later on the Society would take the matter up.

Mr. J. ECK considered the report and the demonstrations most interesting. They compelled admiration, and must be of enormous value to shopkeepers. They had reason to feel that the knowledge of correct methods of lighting had become much more general as a result of the efforts of the Society during 17 or 18 years. Nevertheless there were still many sections of the general public who required education. The E.L.M.A. had also done a great deal during its few years of existence to bring the importance of the matter home to the public, and he felt sure that the Society recognized how useful these efforts had been. The demonstration of domestic lighting had been most effective. They were very thankful to Miss Hodge for emphasizing the importance of good lighting in the kitchen. That was something on which they should all concentrate.

He thought that illuminating engineers had reason to quarrel with electric supply companies in regard to the very high prices charged for current. City offices, and even offices in Westminster, gave a good load factor, and he saw no reason why prices should be based on an average of one and a half to two lighting hours per day per lamp.

Mr. C. R. RAFFÉ, speaking of the model house, remarked that it apparently contained no bathroom! It was most important that the bathroom should be well lit. The daily process of shaving the face needed a particularly good light. In this and other cases care had to be taken to get rid of the reflection of lamps from mirrors. The same consideration applied to outside lighting of shop windows. He had noticed cases where there was such a vivid reflection in the plate-glass that the goods in the window could not be seen. He thought that there should be sprayed lights outside if there was plate-glass. Sometimes on a very bright day one could not see the contents of a window because the plate-glass reflected objects in the roadway. Possibly the glass might be slanted, giving a foot hang to alter the angle of incidence, and the difficulty might also be partially overcome by artificial lighting during daylight hours.

The question of the lighting of schools, especially technical schools, was very important. In some there was the most atrocious lighting system. With regard to one school, he had refused to continue to teach there because the system of lighting was very bad, and the building was not properly ventilated. His offer to resign had resulted in the introduction of a new and efficient system.

An Educational Conference was held every year at University College, London, and it would be a good plan if lighting demonstrations could be given to those attending the Conference to show what could be done. He was confident that many of the teachers would insist on good lighting if they saw the results.

Mr. L. GASTER, interposing, agreed with the last speaker that school lighting constituted a most important field for effort. He might mention that this question, amongst others, was being considered by a joint committee formed by the Association of Medical Officers of Schools, of which he was a member. It was proposed to devote a meeting of the Society to the discussion of this subject very shortly, with a view to taking up again the work of the committee which had issued a report on school lighting in 1913.

He also entirely agreed with the remarks of Mr. Simon on office lighting. He understood that legislation now being framed would include good lighting as one of the essential requirements in relation to health and safety, and this Bill, if carried through, would place offices in the same position as factories in this respect.

The CHAIRMAN (Mr. C. W. SULLY) said that he had that morning read a statement of an eminent American as to the causes of disease in commerce. One of the causes dealt with was apathy in regard to installing modern machinery and appliances. He thought that there was an opportunity in this country of effecting a great improvement by the introduction of proper illumination. If people had the courage to introduce modern appliances the whole character of this good old country could be beneficially changed.

Special reference had been made to the apathy of the central stations. During the last few months the work of the Lighting Service Bureau had resulted in getting dozens of central stations to go in for similar bureaux in their districts, and he hoped that before very long the apathy would be cured.

Office and school lighting certainly needed great attention. As far as the Lighting Service Bureau was concerned, it had been found advisable and necessary to tackle only one point at a time, but he hoped that very shortly these particular matters, and others, would be dealt with.

Mr. G. HERBERT briefly expressed his appreciation of the demonstrations, especially the ingenious model house, and other speakers referred to various details in connection with these displays. It was suggested. for example, that the small model box illustrating shop-lighting might be modified so as to enable the shopkeeper to put himself in the place of the customer and observe the effects of glaring lights in a window. Another speaker remarked that one of the great difficulties of lighting experts was that so often the lighting of a house was regarded as a secondary matter. In some cases houses were actually occupied before a supply of electricity was thought of. The root of the question was £ s. d. Proper electric-lighting facilities should be available in the first instance; it was exceedingly difficult to get people to spend money twice on installations. It would be a great advantage if a powerful body like the E.L.M.A. would use its influence to ensure that electric lighting should be considered before new houses were built instead of afterwards.

Mr. T. J. SHORT (The Polytechnic) congratulated the E.L.M.A. on the good work it was doing. There was still urgent need for propaganda. He had been amazed at the poor lighting conditions in one of the largest stores; the lights were badly placed, and there were

troublesome shadows. Some of the staff found a difficulty in doing their work owing to the poor illumination, and had petitioned the management to have it altered. There should be a recognized body, to whom an appeal could be made in cases of this sort.

A short time ago he had been asked to advise on the lighting of an underground kitchen, and wished that Miss Hodge had been there to help him. He had found great difficulty in finding a suitable system. He would like to suggest that the E.L.M.A. should show, by demonstrations, how black walls and dirty ceilings should be dealt with in cases of this description.

He had had some experience of school lighting, and agreed that the conditions were often unsatisfactory. The great trouble in this case was usually to find funds for the provision of new lamps and fittings. Amongst other subjects that need attention he mentioned the lighting of kinema theatres and churches. It was surprising how defective the lighting of some kinema theatres in London was, and he had recently visited churches which were glaring examples of the misuse of light. He wished the E.L.M.A. could arrange to fit up a small church on approved lines in order to show how things should be done.

Mr. J. S. DOW said he was glad to find in the report a reference to the value of the good work that the B.E.S.A. was doing. Mr. Gaster had referred to the activities of these various committees and to the committee working under the Department for Scientific and Industrial Research. It had been said with truth that the time had come for concentration on propaganda in favour of better lighting, and the entertaining and instructive demonstrations they had witnessed showed what good work the E.L.M.A. could do in this field. But it was necessary that, side by side with this educational work, scientific research should continue. This was fully realized in America, and on the Continent, where illuminating engineering was making great strides. The prestige of this country demanded that its experts should be encouraged to study illumination on the scientific side, and that it should have a powerful and well-supported Illuminating Engineering Society capable of taking a leading part in the international movement.

Reference had been made to the need for greater enterprise on the part of electric supply undertakings. Those present were well aware of the peculiar legislative and other difficulties in this country; but the contrast between methods here and the extensive propaganda of supply companies in the States was very striking. He noticed that there was a tendency in designing all-electric houses to concentrate on the use of electricity for heating, cooking, and other domestic uses; in some cases provision was made for a large load of this description, and the lighting was scrimped. Lighting was still responsible for a very substantial proportion of the revenue of supply companies, and they should not make the mistake of ceasing to take an interest in this field. At the last annual meeting of the Institution of Gas Engineers a strong plea had been made that the lighting field should not be neglected. It was felt that in some quarters attention had been concentrated almost entirely on heating, with the result that lighting had suffered. Similar conditions had arisen in connection with acetylene, people in this country being obsessed with the importance of the welding work and neglecting acetylene lighting; on the other hand, in France the powerful supervising body had encouraged lighting in every way, with the result that the proportion of acetylene used for lighting was as great as before the war.

Mr. W. E. BUSH said that the Lighting Service Bureau proposed to tackle, one at a time, the various subjects which had been mentioned, and to tackle them thoroughly.

With regard to shop-window lighting, he did not think it possible to have too much artificial light. He did not see why artificial lighting should not be brought up to daylight intensity, but, of course, care should be taken to avoid undue glare. It should not be any more harmful to the eyes than sunlight was, but the source should be hidden. High-intensity lighting had a very considerable influence on the development of business. It made the place in which it was installed a centre of attraction, and people who were not concerned with, or particularly interested in, the question of lighting, were struck by the remarkable nature of the installation and talked about it.

With regard to central stations, one point which those connected with them were inclined to overlook was the fact that as the lighting intensity was increased the load factor was increased. There were many establishments, particularly in the West End of London, where the artificial lighting inside was better than the daylight which entered, and that being the case, naturally the artificial lighting was continued all day, and therefore there was a very constant load factor.

He thought that the time was coming when high intensities would be installed in windows to overcome reflection. It was possible that in such cases the current might be supplied at as cheap a rate as for power, if not at a cheaper rate.

He believed that in time outside lighting for shop windows would disappear, because, in his opinion, it was not in the best interests of the shopkeeper or the community. It tended to make merchants compete in providing the greatest glare. Some London streets were uncomfortable to walk in because of the glare; Edgware Road was an example. Sometimes the glare was so great that the shop windows could not be looked in with comfort.

Mr. L. GASTER, in referring to Mr. Short's remarks, said that he had already mentioned that the Society would be dealing with the lighting of schools in the near future. They were very glad to have Mr. Short's endorsement of the need for education in correct methods of lighting, and he might remind those present that Mr. Short was at present giving a complete course of lectures on this subject at the Polytechnic. The Polytechnic had shown great enterprise, first in co-operating with the Society in the special series of lectures on illumination given by experts during the past year and next in subsequently arranging a permanent course, which was now proceeding. This course had not received from the lighting industry all the support that was anticipated, but he felt sure that the Polytechnic would be ultimately rewarded for their perseverance, and that they would be imitated by other educational institutions.

With regard to Mr. Bush's remarks, he fully concurred in the benefits of good lighting in shops, which received an immediate financial return for expenditure on generous illumination. He wished to suggest, however, that care was necessary in making comparisons between natural and artificial lighting, and especially in suggesting that standards of artificial lighting should be based on the intensities available by daylight. In every case it was necessary to consider the exact nature of the daylight conditions. Daylight, unlike artificial light, was not under control, and varied between wide limits. There were special factors, such as the fact of the bright sky being visible, that profoundly affected one's judgment of natural illumination. In some cases, as Mr. Bush had remarked, the facilities for access of daylight into a building were so poor that the actual intensity of illumination inside the room might frequently be less than that ordinarily afforded by artificial light.

Mr. HUGHES, referring to omissions in the report to which attention had been called, said that he felt sure that the meeting would appreciate that it was almost impossible in a comparatively short paper to cover all the branches of the lighting industry. The report was a report on progress. No doubt there had also been progress in connection with commercial lighting, cinema lighting and in other fields, but the report dealt chiefly with those phases of lighting in regard to which there had been definite and outstanding improvement.

The question of the attitude of central stations was one of very great importance, and in this respect there had been a distinct advance. Some central stations had set up their own demonstration rooms, and eventually

the central stations must go into the question of the rates charged for current. Where it was worth the while of the shopkeeper or office manager to have the artificial light put on early, naturally it would be done, and that would help the central station in regard to its load curve.

The question of further subjects to be discussed by the society was a very interesting one. He understood that the next paper would deal with the lighting of mines from the psychological point of view, and this was also an important field for action.

The CHAIRMAN (Mr. C. W. SULLY), in closing the discussion said that the remarks of speakers had shown that there was still plenty of work to be done. They were all still fighting for more light. Reference had been made to the proportion which lighting formed of the total consumption of electricity generated. He had recently noticed in perusing the reports issued by the Electricity Commissioners that the amount of electrical energy used in this country for lighting and domestic purposes was very little more than the amount lost in transmission or otherwise unaccounted for. This showed that there was plenty of scope for supply companies.

He hoped that advantage would be taken of every opportunity of dealing with other subjects that required consideration, and the discussion had given them every encouragement to do so. Mr. Gaster, in his recent report to the Society, had referred to many different developments, including the starting of a course in illumination at one of the technical colleges in London, and this was a most important step in the right direction. There were endless ways of promoting progress in illumination. Neither the E.L.M.A. Lighting Service Bureau, nor any other body, could stand by itself. It was necessary to enlist the help of everybody and make the movement as widespread as possible, and he hoped that the Society would use every effort in this direction.

On the proposal of Mr. L. GASTER, a vote of thanks to the E.L.M.A. for their hospitality, to Mr. S. H. Callow for the report, and to Miss Hodge and Mr. Bush for the demonstrations, was passed with acclamation. It was announced that the next meeting would be held at the Royal Society of Arts on January 21st, 1926, when a paper would be read dealing with the Illumination of Coal Mines. This brought the meeting to a close after a most enjoyable evening.

New Methods of Propaganda

An ingenious form of propaganda in favour of better lighting was recently adopted by the Illuminating Engineering Society in the United States. The first meeting of the New England section was devoted to the presentation of a playlet entitled "What Price Light," by Mr. S. G. Hibben. This was followed by an instructive kinema film entitled "Yesterday and To-Day." The meeting is stated to have been very well attended and to have proved most successful.

Royal Sanitary Institute

Forthcoming Congress

We note that the Royal Sanitary Institute will celebrate its Jubilee by holding an Imperial Congress in London during July 5th-10th, 1926. On the opening day the Rt. Hon. Neville Chamberlain, as President, will deliver the inaugural address. The Lord Mayor and Corporation of London have granted the use of the Guildhall for the opening meeting, and arrangements have been made for other meetings to be held in the Central Hall, Westminster. Full particulars will be furnished by the Secretary, Mr. E. White Wallis, 90, Buckingham Palace Road, London, S.W.1.

Luminous Signals for the Guidance of Traffic

MUCH interest has been taken in the use of luminous control signs for traffic in American cities, and it will be recalled that Sir Henry Maybury recently paid a visit to the United States with the object of studying these conditions and determining how far they can be applied in this country.

It is, therefore, worth noting that similar methods are now being experimented with in Germany, and were described in a recent contribution by Herr W. Janke to *Licht und Lampe*.* It is pointed out that owing to the noise of modern traffic audible signals are of little value. Hence the idea of using luminous signals which should be visible alike by day and by night. A second consideration is that the construction should be such that no high costs of maintenance are involved. Thirdly, the design must be of a pleasing character, so that the signal-posts are not unsightly, but conform to the general architectural style of buildings in the street.

For streets crossing each other at right angles a mast with a lantern at the top is used. The lantern carries three adjacent lights, showing either red for "stop," green for "proceed," and yellow for "take care." The lights are so adjusted that the desired signal can be given simultaneously in each of the four streets, and by using special projecting apparatus the lights are rendered bright enough to be seen during the daytime. The control for the lights is situated at the base of the mast and is operated by the police officer on duty. When there is no convenient place for a mast, hanging on signals mounted on wires spanning the street are used.

An entirely different design is embodied in the device, introduced by the Julius Pintsch A.-G., which consists of a small dome, with translucent apertures, let into the paving in the centre of the road. The translucent lozenges are illuminated by a lamp concealed within the dome, and the whole apparatus is so strongly constructed that should it be run over by a passing vehicle it is not broken. These devices can be applied for various purposes—for example, a series may be used to divide the flow of traffic.

In view of the recent fatal accident to a motor-charabanc at a railway level-crossing in this country, it is to be observed that in Germany special attention is being paid to the problem of rendering such crossings clearly evident to motorists. The article contains illustrations of several devices of this kind, some carrying bull's-eye lenses illuminated by a winking light, others an illuminated chamber of diffusing glass, indicating the locality and revealing a warning notice; this and the "winking" device may be used simultaneously. Signals of this kind may be operated by electricity, oil-gas, or dissolved acetylene.

In view of the great growth of rural motor-traffic such signals are considered absolutely necessary; otherwise there will doubtless be an increasing number of serious accidents. In Austria, as is well known, there has been for some time an objection to the fencing in level-crossings, the contention being that this affords no real protection. Careless motorists are liable to run into the barrier owing to a feeling of false security and come to a stop on the rails whilst a train is passing, thus endangering not only themselves but the railway train. (The view apparently being that if there were no barrier they would be more careful, and that in any case they would be more likely to pass through before the train arrived!)

It is evident, however, that the general use of luminous warning signals would contribute very greatly to the elimination of accidents of this class.

* December 17th, 1925, page 919.

Twenty-one Years of Illuminating Engineering

A Record of the Activities of Mr. L. Gaster (Hon. Secretary and Founder of the Illuminating Engineering Society and Editor of "The Illuminating Engineer")

MR. LEON GASTER, who has been associated with the Illuminating Engineering Movement from its commencement in this country, is the son of Chevalier A. E. Gaster, of the Dutch Diplomatic Service, and was born in 1872 at Bucharest (Roumania), where he was educated, taking the degree of Bachelor of Science and Arts in 1890. After studying at Bucharest University, he entered Zurich Polytechnic in 1891, working in the Electrotechnical Laboratory under Professor Weber until 1895, when he moved to England, becoming a naturalized British subject in 1902, and commencing his present practice as a consulting engineer in the following year.

From this time onwards he has taken a keen interest in illumination. In 1905 he contributed a leading article to *The Times Engineering Supplement* on "The Standardization of Electric Light," which may be regarded as a forecast of present lamp specifications. In 1906 he was awarded the silver medal of the Royal Society of Arts for his paper on "Progress in Electric Lighting," and in 1909 delivered a series of Cantor Lectures before this society, dealing generally with all the chief systems of lighting and their applications. Meantime he had visited the United States and the Continent with the object of studying progress in illumination, following which he started *The Illuminating Engineer* in 1908. He has ever since been Editor of this journal. He had already become convinced of the need for *The Illuminating Engineer*, which was discussed in a paper read before the Association of Engineers in Charge in 1907.

The Illuminating Engineering Society was founded by him with the co-operation of a small band of enthusiasts in 1909. *The Illuminating Engineer*, which paved the way for the Society, has acted as its official organ since its inception, thus relieving the Society of considerable expense. From the very start the co-operation of user and producer of light and the development of an international connection were regarded as leading features of the Society's work. Hence Mr. Gaster's interest in illumination has led to participation in many other fields of activity.

As Hon. Secretary of the Illuminating Engineering Society, Mr. Gaster has been present at every meeting since the Society was formed in 1909, and has read papers before it on many occasions. He is also joint-author of "Modern Illuminants and Illuminating Engineering," the first comprehensive work on this subject issued in England, and he has lectured very frequently on various aspects of illumination before other societies and at numerous congresses and exhibitions. As instances may be mentioned papers before the Royal Society of Arts, the British Association, the London Society, the National Gas Exhibition (1913), the Society of Dyers and Colourists, the Association of Engineers in Charge, the Electrical Contractors' Association and the Association of Supervising Electricians, etc. He also prepared a special illustrated pamphlet on "Good Lighting as an Aid to Safety" for the British Industrial Safety-First Association and lectured on this subject before the Conjoint Conference of the Home Office and the London Safety First Council in 1920. By the courtesy of the B.B.C. he recently broadcast two "talks" on lighting of the home, office and factory.

Amongst other international congresses visited by him may be mentioned the International Petroleum Congress (Bucharest, 1907), the International Congress on Industrial Hygiene (Brussels, 1910), the International Electrical Congress (Turin, 1911), the First International Congress for the Prevention of Industrial Accidents (Milan, 1913), Annual Congresses of the Royal Institute of Public Health (Paris, 1913; Brussels, 1920; Geneva, 1924), the International Congress of Hygiene (Amsterdam, 1925), the International Illumination Commission (Berlin, 1913; Paris, 1921; and Geneva, 1924), etc. On the occasion of his visit to the United States in 1913 he gave a special interview to *The New York Times*, dealing with illuminating engineering, which was made the subject of a full-page article. His visits abroad, undertaken almost every year, have aided greatly in establishing relations with lighting experts in foreign countries, and enabling first hand information on progress in illumination to be obtained.

Mr. L. Gaster is *ex officio* a member of all the various standing committees of the Illuminating Engineering Society. He is a member of the National Illumination Commission of Great Britain and of the Executive Committee of the International Illumination Commission and British representative on the International Committees dealing with the lighting of schools and factories; a member of several sub-committees established by the British Engineering Standards Association, dealing with lamps, fittings, etc. He is also a member of the Departmental (Home Office) Committee on the Lighting of Factories and Workshops, and a member of the Lighting Committee of the Home Office Industrial Museum. During the war he rendered service on the joint committees set up by the Illuminating Engineering Society at the request of the Ministry of Munitions to test the illuminating power of flares, star-shells, etc., and the brightness of radio-active luminous

material. He also acted as lighting expert to the Household Fuel Controller (Board of Trade). He is a member of the joint committee recently formed by the Medical Officers of Schools Association to study "The Ideal Classroom," including lighting conditions. He is also an Hon. Member of the Institute of Public Lighting Engineers. He is also a member of the Committee on Illumination working under the Department of Scientific and Industrial Research, which is doing work of great national and international value.

As an instance of services to other kindred associations, special reference may be made to Mr. Gaster's association with "Safety First" work. He is a member of council and of various committees of the National Safety First Association, mainly concerned with lighting problems. Mr. Gaster has also taken an active interest in the Association of Special Libraries and Information Bureaux, and has been elected a member of the executive committee of this association.

Journalistic Activities.

Although best known to our readers as the Editor of *The Illuminating Engineer*, Mr. Gaster has many other journalistic activities. He is a Fellow of the Institute of Journalists and for many years a member of its London District Committee, and was during the war period Chairman of its Scientific, Trade and Technical Circle, of which he is now Hon. Secretary. He is also the Honorary General Secretary of the British International Association of Journalists, a body affiliated with the International Press, which includes amongst its members British journalists interested in foreign affairs, and which aims at establishing cordial relations between members of the press in different countries. Visits undertaken in connection with this Association (in many cases as the guest of the Government of foreign countries) have likewise afforded valuable opportunities of studying lighting conditions abroad and interesting foreign journalists in this subject. He has also been elected one of the first Vice-presidents of the International Federation of the Technical Press, formed as a result of the conference held in Paris last year.

In recognition of these widespread scientific and journalistic achievements Mr. Gaster was recently made a Commander of the Crown of Roumania. The foregoing sketch will serve to give a general idea of his activities. The number of committees with which he is associated, and for which he gives his services in an honorary capacity, is difficult to specify accurately, but is probably not less than thirty, and he has been responsible for at least fifty different lectures, papers and articles dealing with various aspects of illumination (apart from editorial contributions to this journal). When it is added that he is a contributor to various leading journals on other subjects, and that in addition to his consulting work he acts as honorary consulting lighting engineer to a number of charitable institutions, it will be gathered that he is a tolerably busy man!

All these activities, however, interlink, the primary object of all being the promotion of a better understanding of the benefits of good illumination.

POPULAR & TRADE SECTION

COMPRISING

Installation Topics—Hygiene and Safety—Data for Contractors—Hints to Consumers

(The matter in this section does not form part of the official Transactions of the Illuminating Engineering Society; and is based on outside contributions.)

The Lighting of Offices

ALTHOUGH the lighting of offices forms but a small section of the illuminating engineers' field, it is none the less an important one.

With every increase in the size of buildings, both in height and area, the possibility of each office receiving direct sunlight during the daytime becomes more and more remote, so that in many modern offices the whole of the work has to be done by the aid of artificial light. It is evident, therefore, that much evil may be done unless the lighting system is designed on sound principles.

In the first place, the eyesight of the workers may be safeguarded by means of correct installations, and this by itself is no small service. Mistakes in copying, checking, reading, etc., will be greatly reduced, so that the work will run more smoothly than where the office is badly lighted. Supervision and general administration will be made easier, with the result that a better feeling will exist throughout the office.

Put briefly, the essentials of good office lighting are as follows:—

1. There must be sufficient illumination on the working plane.
2. Shadows should be avoided both from the building and also from the worker's own body.
3. Glare and consequent eyestrain must be eliminated.

The lighting of a large number of offices at the present time is out of date, and one still finds the old fittings in use which were installed in the days of the carbon lamp equipped with the new gasfilled lamps. These old local lighting units make no pretence to efficiency, and do not direct the "raw" light of the lamp in a proper manner.

The following faults are most general:—

1. Lamps are placed too low.
2. Too numerous.
3. Prevalence of glare.
4. The light is badly distributed.

It is suggested that for general office work an illumination of eight foot-candles is sufficient, but under some circumstances this value may well be exceeded. Light, in order to be effective, must be under control, and the units should be so spaced that objectionable shadows are avoided.

In addition to discomfort caused by the direct glare from the lamp itself, a worker using polished surfaces such as glazed paper often experiences annoying reflected glare. This form of glare is most objectionable since the eyes are particularly sensitive to light from below, and the nature of the worker's task compels him to direct his eyes constantly in this direction.

At this point it may be objected that expense will prove a difficult obstacle to overcome, but in view of the importance of good lighting to all who would run their offices on efficient lines, this objection should not weigh very heavily. Good lighting is as imperative as good water, and as an investment it pays dividends in the form of increased output.

FIG. 1.—Example of a large office lighted by diffusing fittings.

FIG. 2.—Good office lighting by means of totally-enclosed diffusing units.

In the case of one large block of London offices the water rate came to £416, while the cost of good electric lighting amounted to £435.

Mistakes, like dirt, cost money, and the impossibility of reading figures, due to bad lighting may be extremely costly. Moreover, it is not often realized that daylight itself costs a considerable amount. In large city offices where ground is extremely expensive quite a lot of floor space has to be devoted to form a light well, and if only this space were devoted to extra offices the rent obtained would be increased. Strictly speaking, this loss of rent should be debited to the cost of providing daylight. Furthermore, it has been estimated that the provision of windows alone necessitates quite a considerable expense in upkeep as regards cleaning, while because windows are provided the cost of heating the building is greater than it would be otherwise, owing to the loss of heat through the windows.

It should be added that the cost of higher intensity lighting does not increase in the same proportion as the illumination owing to the greater efficiency of higher-wattage lamps and the proportionate reduction of overhead installation charges.

The chief types of lighting systems employed in offices at the present time are direct, indirect, and semi-indirect.

Unless very carefully planned, the direct system is apt to be a great offender in the matter of "glare" and shadows. The best way to avoid these undesirable results lies in the use of white or opal lamps, deep shades, and a close spacing.

Indirect lighting provides an almost shadowless illumination without glare, but suffers from the serious disadvantage that unless frequently cleaned the fittings lose their efficiency, which at any time is not great, owing to the settlement of dust on the reflecting surfaces within the fittings.

To some extent the semi-indirect fitting, with its open, translucent bowl, suffers from the same defect, but its initial efficiency is substantially greater than that of the totally indirect type.

The undesirable features mentioned above are largely overcome by the most recent development in fitting design—namely, the totally enclosed diffusing unit. When correctly installed this type of fitting provides an illumination almost free from shadows, and entirely free from glare. Its smooth and entire surface collects comparatively little dust, and is easily cleaned. From all points of view, therefore, it is superior to other types for office lighting of a general character.

In designing a lighting installation for an office it is important to ensure that the surface brightness of the fitting itself is not too great, and in general a figure of 1-2 candles per square inch should not be exceeded. It often happens that a lamp of high wattage is placed in glassware which is too small, with consequent discomfort to the employees. The general overhead method of illumination presents a considerable advantage over any other in view of the fact that it is more nearly suitable for any arrangement of the office, and the subsequent rearrangements of desks, etc., can be carried out with the minimum of alteration to the lighting system.

Excellent results may be obtained by suspending totally enclosed diffusing units about 10 feet from the ground, spacing them 10-12 feet apart, and equipping each with a 200-watt gasfilled lamp. An installation based on these lines gives about 10 foot-candles on the desks, while such shadows as occur are soft and luminous.

English Winter—Lack of Light

A correspondent in the daily press makes a pertinent comment on the general dislike to the English winter. Much is often made of the cold and variable conditions. But it is pointed out that severe cold and marked fluctuations in temperature are not unknown in Italy and on the Riviera, and the same might be said of Egypt, Algiers, and other alleged favoured spots. The great drawback to the English winter, he affirms, is the feeble light, which has a generally depressing influence.

Intensive Illumination in the Market Garden

DURING recent years a number of interesting experiments on the use of intensive illumination (up to 1,000 foot-candles) as an aid to horticulture have been made in the United States, and were reported in this Journal.* In dealing with these developments we expressed the hope that similar researches would be undertaken in this country. It is therefore interesting to note that Mr. R. Borlase Matthews has been experimenting on the subject at his farm near East Grinstead, and some promising results were recently recorded in *The Electrical Review*.†

The initial experiments were made with 1,000-watt gasfilled lamps, equipped with large reflectors, and placed about three feet above the pots containing the plants under treatment. The tests were carried out on ordinary plants usually found in greenhouses associated with a garden of a fair size.

In every case the progress was remarkable. The plants were placed under the light when buds were just beginning to form. Similar control plants placed away from the light took four weeks to flower. On the other hand, daffodils and Lent lilies, when placed under the light for six hours a night, flowered in four days, growing about an inch a day; narcissi flowered in seven days. By means of a self-winding automatic switch the lamps were switched on at midnight and off at 6 a.m., i.e., the current was used for lighting the plants when not required for any other purpose.

In view of this fact electric supply undertakings might be expected to grant special low rates to market gardeners, as the current would be taken at times when there is very little load. Nevertheless, in order to obtain this intensive illumination, the lamps have to be placed very near the pots, so that the cost of energy, even with electricity at one penny per unit, is very high. It might, therefore, only be commercially practicable for a special seasonal trade, i.e., for getting plants into bloom very early so that high prices could be realized.

In casting about for some means of rendering this use of light feasible for ordinary market gardening operations, Mr. Matthews hit on the idea of exposing each of the plants in a greenhouse in turn to one night's light treatment. It was found that under these circumstances also plants made remarkable progress—indeed much greater than the average per day if the plant were illuminated for a number of days in succession. It seems worth while for market gardeners to study this possibility. The most convenient method is to suspend the lamps from an overhead runway of galvanized wire so that each lamp can be easily moved into a fresh position for each night's treatment.

It is also to be remembered that scientific work in this field is in its early stages. Different varieties of plants require different intensities of illumination. Plants may be roughly classified as (*a*) those which respond to long days and therefore bloom in the summer-time, and (*b*) those which require only a short day and bloom in early spring or late autumn, and (*c*) those to which the length of day seems to be immaterial, and which, therefore, bloom all the year round.

In connection with flowering plants, as indicated above, cost of energy is an important consideration. But in certain forms of scientific work, seed breeding for instance, this cost is of small importance. In America, in intensive illumination, it has been possible to obtain four crops of wheat in one year, and thus in that period to establish the fixedness or otherwise of a new breed of seed, instead of having to wait for four or five years. As is well known, in the breeding of new seeds, only time will prove whether a new variety will remain true to type or not; many excellent samples of seed revert to an inferior ancestral stock in the course of several generations; hence the great importance of knowing whether the new variety is really a stable form.

* *Illum. Eng.*, May, 1924; Oct.-Dec., 1924.
† *Elec. Review*, Oct. 30th, 1925.

FIG. 1.—This reproduction from an untouched photograph of a large office in which gas ventilating ceiling lights are used gives a good idea of the all-round efficiency of this system of lighting. It is doubtful if more even illumination could be obtained from daylight. The lights are placed sufficiently high to prevent the possibility of anyone working in the office experiencing eyestrain. The photograph was taken at the end of a winter's day, when doors and windows had been kept closed as much as possible. The clearness with which all objects in the office are to be seen may therefore be taken as striking evidence of the clarity of the atmosphere brought about by the valuable ventilating action of the lights.

Ideal Ventilation Combined with Lighting

IN all large buildings—churches, public halls, offices, restaurants, libraries, and the like—where numbers of people congregate, it is essential in the interests of health and hygiene to ensure efficient ventilation, so that the air contaminated with the deleterious organic matter which comes from the lungs and skins of those in the room may be replaced frequently by pure air. It is equally important from the point of view of the health of those in the buildings that this movement of air should be brought about without creating an uncomfortable draught. In actual practice this latter stipulation, owing to the varying likes and dislikes of the individuals in the building and the particular positions which they occupy, often precludes the employment of the most obvious means of ensuring ventilation, namely, the opening of doors and windows.

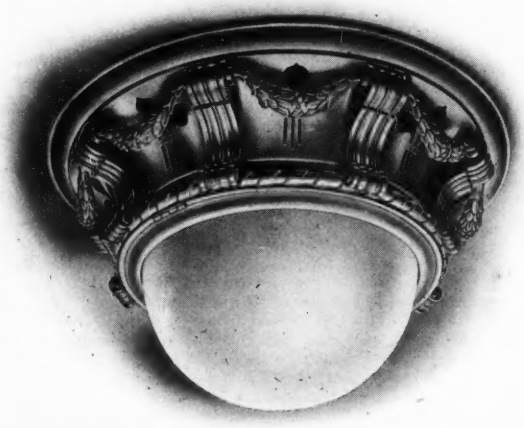


FIG. 2.—A beautiful type of ceiling ventilating light, fitted with cluster gas burners and super-heater.

It would be well, therefore, to consider the question as to what happens to the air in an apartment in which a number of people are assembled. The organic exhalations and emanations, to which reference has been made, being warmer than the surrounding air, ascend towards the ceiling or roof, where, if proper means of egress are provided and the conditions are otherwise satisfactory, they will be carried away, thus causing fresh air from outside to enter the lower portion of the room.

In buildings which are often closely packed with people, however, it will sometimes be found that the natural ventilating properties of the building are inadequate. The large quantity of vitiated air produced will, in course of time, owing to its inability to escape quickly enough, occupy space lower than that at ceiling or roof level, and, particularly in the case of buildings with galleries or fairly low ceilings, will ultimately descend to breathing level. In lofty buildings in which no special means are employed for heating the walls, windows and ceilings it will often be found, too, that in cold weather the rising currents of warm air become chilled; if, therefore, easy means of escape for the warm air have not been provided, these currents will fall, or will at least be prevented from ascending. If they fall, a sensation of draught will be experienced—in fact, many of the draughts complained of in lofty buildings are due to this chilling of upward currents and their subsequent descent. This descending air is not suitable for breathing purposes. Even where a somewhat expensive

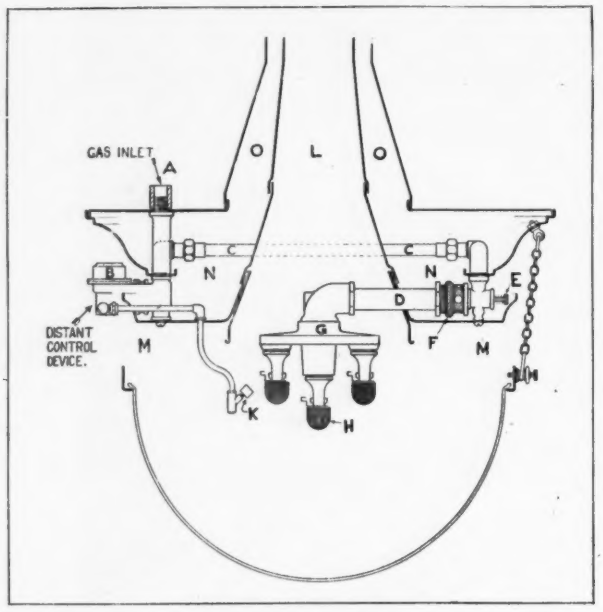


FIG. 3.—Sectional elevation showing design and details of a ventilating gas light with outlet shaft arranged for vertical connection. This shaft can also be arranged for horizontal connection. The gas supply is connected at point "A" and passes through the distance control device "B," then through pipe "C" to mixing tube "D." This mixing tube is provided with a regulating gas nipple and air-chamber, "E" and "F." From the mixing tube the gas and air mixture enters the superheating chamber "G," and in its superheated state is conducted to the mantles "H." One by-pass jet "K" is employed to light the group of mantles. The products of combustion escape through the flue "L," and the vitiated air of the room through the openings "M" "N" into outlet shaft "O." The glass bowl is carried in a spun ring suspended by chains, and is easily removed for cleaning.

means for heating the walls is adopted, this may not entirely overcome the difficulty unless adequate means of exit for the heated air are provided. Fans, while they undoubtedly carry out the valuable function of keeping the air of the building in movement, have little ventilating effect, and therefore do not remove the vitiated air—unless, of course, they are connected to an outlet shaft.

The ideal solution of this problem of ventilation in large and medium-sized buildings is a combination of ventilating ceiling gas lights and Tobin tubes, or similar devices. Incandescent gas burners, owing to the heat which they give out, create a strong uprush of air, and when fixed at the base of a special shaft communicating with the outer air have a greatly increased ventilating effect. This is the principle on which ventilating gas lights act, while at the same time furnishing an ample well-diffused light from a height which in most circumstances prevents all possibility of eyestrain.

Figs. 3 and 4 show sectional views of two designs in gas ventilating lights*, and the descriptions under them make clear the manner in which they carry out their functions. Fig. 2 is a copy of a photograph of a ventilating light.

For the admission of fresh air into the building, inlet tubes, of which various types are available, should be fixed in the walls some four to five feet above floor level, and these tubes should communicate wherever possible, of course, with the outer air.

The ventilating shafts from the lights to the external atmosphere are generally placed above ceiling level out of sight of those in the room. Where brick flues for gas fires already exist, the shafts from the ventilating lights can be carried into them in the manner indicated in Fig. 6. When this course is not possible the shaft can in many cases be carried up through the roof and terminated above the ridge level of the roof, so that winds from all directions may be free to operate on the outlet end of the shaft. In buildings of a size necessitating the use of more than one ventilating light, the individual shafts from the lights should be carried to a trunk shaft which alone should be taken to the position above ridge-level. If more than one outlet to the external atmosphere is employed there is the possibility of syphon action being set up which would reduce considerably or even nullify altogether the ventilating efficiency of the system. The plan suggested is indicated in Fig. 5.

It is not possible to specify any definite dimensions for the shafting to be employed, because these depend upon the design and requirements of the building or apartment to be lighted and ventilated, and the number of lamps used. When the building has been examined it is customary to specify shafting of such sizes as will ensure that the air is completely changed about three times an hour. Experience has shown that while this rate of air flow is sufficient to ensure healthy breathing conditions for those in the building, it is sufficiently slow not to create an undesirable draught.

In cases where (1) the ceiling is too high for lighting from the surface of it to be economical or effective, or (2) the building has no flat ceiling (such as some churches and public baths), the ventilating shaft is frequently taken down vertically for the desired distance, and the light is fixed at its lower end. This can be done in a manner which is not displeasing to the eye, and often with a greatly improved result from the point of view of distribution of light. In such cases, outlets for the impure air in the room are provided just above the light, and also at the upper end of the shaft.

These ventilating lights, it may be mentioned, carry out their dual function of lighting and ventilating the room at no additional cost for gas for carrying out the

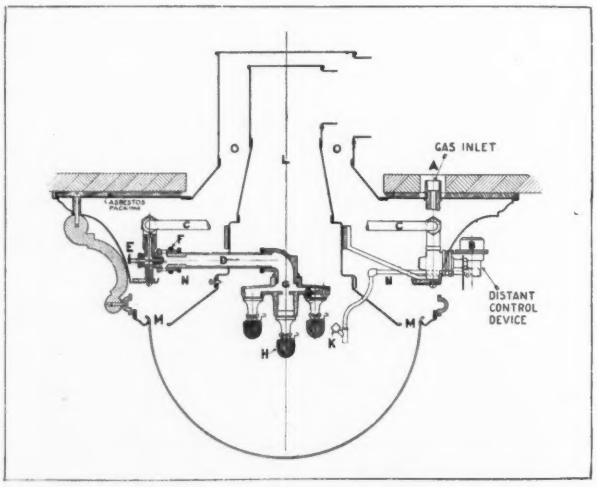


FIG. 4.—Sectional elevation showing another design in ventilating ceiling gas lights, with the ventilating shaft arranged for a horizontal connection. The shaft can with equal ease be arranged for a vertical connection. The gas supply is connected at point "A" and passes through distance control device "B," then through pipe "C" to mixing tube "D." This mixing tube is provided with a regulating gas nipple and air-chamber, "E" and "F." From the mixing tube the gas and air mixture enters the superheating chamber "G," and in its heated state is conducted to mantles "H." One by-pass jet "K" is employed to light the group of mantles. The products of combustion escape through the flue "L," and the vitiated air of the room through the openings "M" "N" into outlet shaft "O." The glass bowl is carried in a hinged door, provided with spring-catch fastening, and is easily removed for cleaning.

* The use of this type of ventilating light is not limited to large halls and buildings. For the small office and for the living room it is equally suitable, and especially is it to be recommended for rooms which are not fitted with an open fire—a coal, coke, or gas fire—and are thus deprived of the excellent ventilating properties of a flue with fire at its base.

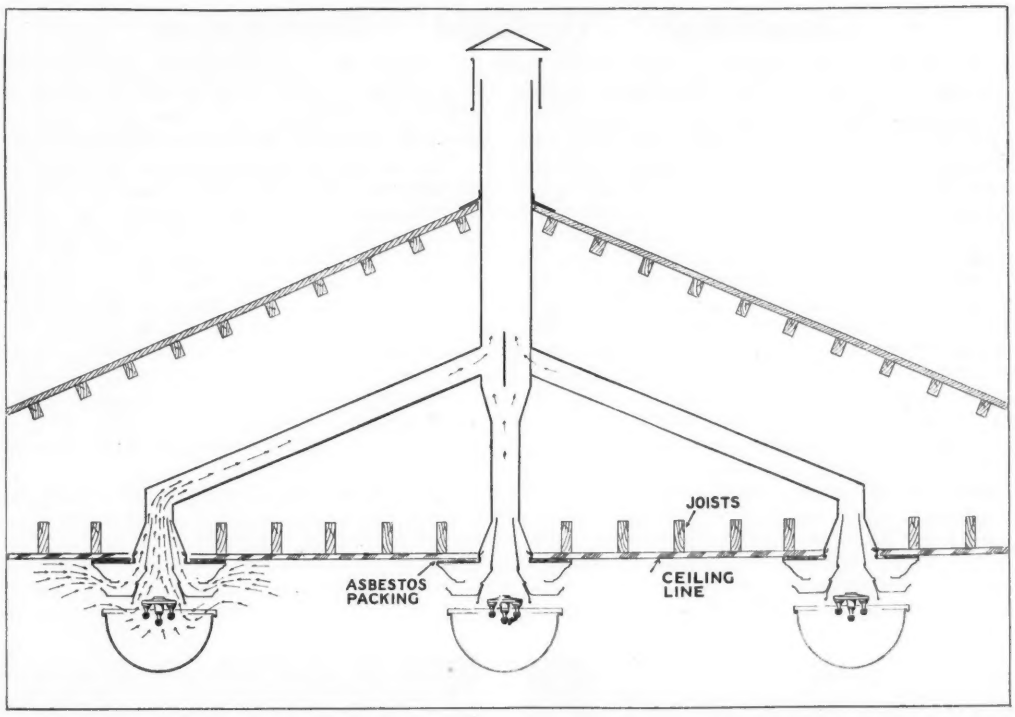


FIG. 5.—Diagrammatic drawing showing method of running ventilating shafts from two or more ventilating gas lights into one main shaft terminating above the ridge level of the roof.

latter function. The amount of gas used depends entirely on the amount of light required, and this consumption will always be sufficient to ensure ample ventilation when the ventilating type of lamp is used.

The ventilating ceiling lights are produced in a number of particularly pleasing and dignified designs. They generally consist of a metal body (finished in oxidized silver or copper, or some other art metal) which tapers downward from the ceiling to form a globe-holder. The burners used are of the super-heater cluster type which gives a very high efficiency and at the same time is economical in maintenance costs. The globes can be obtained in several finishes, of which those most frequently in demand are:—

(1) Opal.
(2) Frosted.
(3) Top half of clear glass, the lower portion frosted.
(4) Clear glass, with a frosted band round the centre, this being the point at which it is desirable at times to screen the source of light to diminish the possibility of glare.

In view of the height at which these lights are fixed, they are almost invariably fitted with a distance control device by means of which they may be turned on or off, either singly or in series, from wall taps placed in any convenient position.

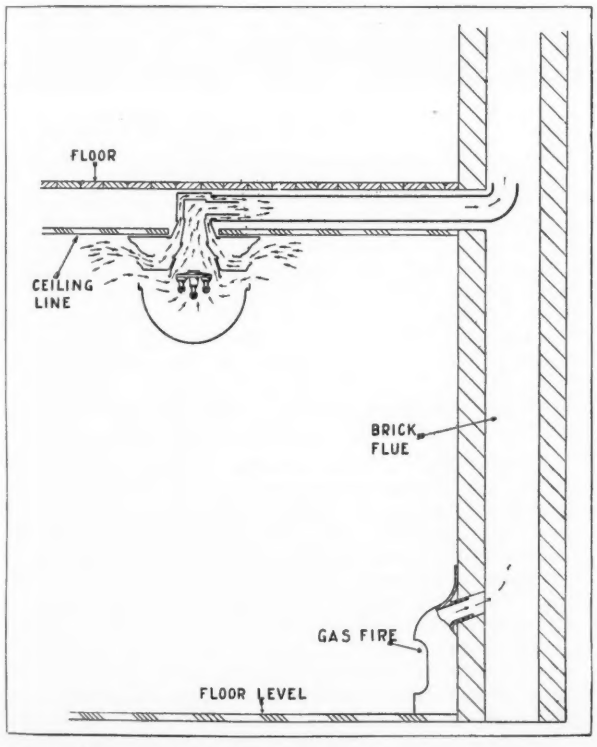


FIG. 6.—Diagrammatic drawing showing how the shaft from a ventilating gas light can be run into a gas-fire flue.

In some churches in which other methods of lighting are installed, and in which the ventilation has been found to be poor, the fixing of flat-flame gas burners at certain points to increase the uprush of air has successfully overcome the trouble. In other more stubborn cases flat-flame burners fixed at the base of ventilating shafts of the type described above have been most effectively employed. It should be borne in mind, however, that the use of flat-flame burners (which give out very little light) instead of incandescent burners results in no increase in the ventilating power of the gas consumed, so that in most circumstances incandescent burners should be used on account of the dual service which they render for the one cost, namely, the provision of light as well as of ventilation.

There is undoubtedly still much room for the extended use of this efficient ventilating system in many of our churches and public buildings, in which the air sometimes becomes decidedly objectionable, if not actually unhealthy, on account of the absence of adequate means for increasing the ventilation. The methods described in this article have been applied in buildings of the most varied character, and have proved a successful solution in many cases where the provision of efficient ventilation presented special difficulties.

Lamplough "Restlight" Illumination

IN this journal attention has often been drawn to the need for distinguishing between various systems of "artificial daylight," and indicating, by means of curves showing the distribution of energy in the spectrum, the degree of resemblance to average daylight. It is also necessary to be clear about the purpose the artificial daylight is to serve. If the unit is intended for very accurate colour-matching—such as is necessary in the dyeing industry—then the quality of light must be made as nearly as possible identical with daylight, even though this involves considerable loss of light. But there are many other cases, for instance in art galleries, shops devoted to coloured goods, etc., where a somewhat less accurate imitation of daylight, involving less loss of light by absorption, may be considered suitable.

These remarks are suggested by an interesting development due to Mr. F. E. Lamplough's "Restlight" system of illumination. Mr. Lamplough's name is associated with research on glasses used to correct the light from gasfilled lamps, and produces accurate artificial daylight. Units utilizing this special Lamplough glass are stated to have proved very acceptable in the dyeing industry, where the demands for accuracy in colour-matching are very exacting. This high degree of accuracy cannot be attained without considerable absorption of light, and it is known that a great part of this loss is occasioned by the final connection necessary to meet the severe demands of specialists in colour-matching work. We understand that the absorption of the latest form of glass is of the order of 75 per cent., though this may be compensated to some extent by judicious design of the reflector, so as to concentrate the great majority of the light where it is needed. But in any case the "inefficiency" of accurate artificial daylight is not of very great consequence in comparison with the great advantage of being able to conduct colour-matching tests independent of the vagaries of natural light.

In the "Restlight" glassware the degree of exactitude aimed at is less (though the approach to daylight is still considered much closer than in many other so called "artificial daylight" units). The absorption of the "Restlight" glass is stated to be less than 50 per cent., and the units are designed to eliminate, so far as possible, all other sources of inefficiency.

(The loss by absorption in many forms of opal bowls commonly used for ordinary purposes of illumination is much greater than is often appreciated.)

The units are available in various forms, as bowls of "Restlight" glass with a special double-cased opal reflector, and as pendants and desk lamps with metal concentrating reflector for local illumination.

The system is proving popular in many cases where an efficient and reasonably close resemblance to daylight is desired. In Fig. 1 is shown the use of the bowls in the Leeds Art Gallery. This installation was recently described in *The British Builder*, by Mr. S. C. Kaines Smith, the Curator, who was very favourably impressed with the results, both in showing off pictures to the best advantage and in revealing the scheme of decoration and architectural features of the rooms. As the illustration (from an untouched photograph by artificial light) shows, the bowls are mounted at a good height, and give a soft and well-diffused effect. The other illustration, Fig. 2, shows the use of the system in the showrooms of Messrs. Hector Powe Ltd.

Apart from the advantage of correct revealing of colours the system has other advantages. Take, for instance, the familiar problem of providing satisfactory illumination during the transition period at dusk, when natural daylight is failing. It is well known that a mixture of daylight and ordinary artificial light is confusing and unsatisfactory. On the other hand, the "Restlight" blends with the natural daylight. A person working at a desk near the window could turn on the unit overhead when daylight begins to weaken and pass through the transition period, perhaps without being aware of the change-over from natural to artificial light. Similarly in factories where it is often only the benches most remote from the window that need supplementary light, the illumination in these sections of the room may be strengthened by the use of "Restlight" units, and the use of natural daylight in the greater part of the room prolonged as much as possible.

FIG. 1.—The vestibule area of the Leeds Art Gallery by artificial light.

FIG. 2.—Showrooms of Messrs. Hector Powe Ltd., 203, Oxford Street, London, W.1.

Finally, there is the question of the value of the system in diminishing eyestrain. The fact that the light is properly screened and well diffused in itself is a good feature from this standpoint. But it is also claimed that the colour of the light, i.e., the elimination of excess of red and orange light, is also restful to the eye. Hence the name "Restlight." This question of the effect of light of different colours on the eye is a complex one, which we would like to see more fully investigated. Meantime, the suggestion that our eyes have been evolved to make the best use of natural light, and that an artificial light closely approaching normal daylight in colour is the most restful and least liable to cause fatigue, is one that deserves careful consideration.

Automatic Clockwork Devices

Exhibit at the Opening Meeting of The Illuminating Engineering Society, on November 26th, 1925

MR. E. H. HORSTMANN, F.B.H.I., of the Horstmann Gear Co. Ltd., demonstrated a series of automatic clockwork devices for controlling both gas and electric lights at the meeting of the Society of Illuminating Engineers held on Thursday, November 26th, 1925.

For the benefit of those readers who were not present, and who are not acquainted with the functioning of these instruments, it may be pointed out that the purpose of same is to light and extinguish lamps automatically at predetermined times, a specially designed clockwork mechanism being the basis of the apparatus, which is suitably connected with the gas tap or electric circuit which it is designed to control.

The first known application of clockwork controllers was in connection with the illumination of church clock dials by gas, the flat-flame burner being turned down low during the day, and gradually turned up at night by the motive power of the church clock. The idea was then applied to street lamps, and we find a recorded instance of the use of controllers in 1868, a Norwich surgeon, Dr. Thurgar, being the inventor of such a controller, which did not, however, appear to have been used to any extent owing, probably, to the high cost of clockwork movements in those days. Early in the present century, however, the idea was revived, and numerous gas companies began experimenting with the two makes of apparatus which were then available. The utility and labour-saving qualities of these controllers were quickly established, and their use has extended very rapidly, especially during the last 12 years.

Although other systems, including the "pressure wave" for gas, have since been introduced, it is generally conceded that the *Unit* clockwork system is the best on account of the fact that the occasional failure of one lamp in a street is not a matter of vital importance, whilst if the control of a group breaks down and a whole street is plunged in darkness very serious consequences are likely to ensue. A large number of different patterns of auto-controllers for both electricity and gas are now available, all working more or less on the same broad principles, although the methods of operation of gas valves and electric circuits vary considerably.

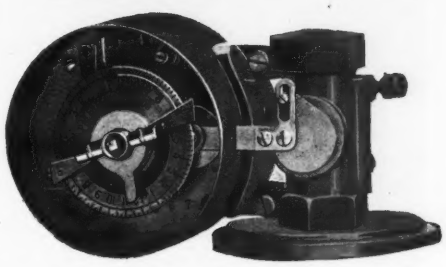
An important feature introduced since the war by the Horstmann Gear Co. Ltd., is the provision of instant detachability of the clockwork operating mechanism without disturbing any gas connections, or, in the case of electric time-switches, of any wiring. In the past, the failure of a clock has meant the removal of the gas burner, the fitting of a spare controller, and the replacement of the burner, mantles, etc. With the Newbridge "Universal" models the clockwork movement may be instantly detached without disturbing any connections, and a guaranteed interchangeable spare clock fitted instantly, with the light still burning, and locked in position with the same key which is used for winding. The advantages of such an arrangement are obvious.

For street lighting the automatic system is forging ahead rapidly, and London, which, owing to the prevalence of fog, has hitherto relied chiefly upon the manual system of lighting is now catered for by special types of controllers which are available with special "fog" attachments for hand operation, without disturbing the normal automatic sequence of operations. It is, therefore, not unlikely that automatic lighting will be further extended in the Metropolis in the near future. In those towns with a clear atmosphere where fortnightly cleaning of lanterns is sufficient and a 15-day clock may therefore be used, the average saving by the adoption of controllers is approximately £1 per lamp per annum, this figure being appreciably exceeded in many instances. For lighting of shop windows after closing hours, the advantages of automatic controllers are at once apparent. Newbridge models are available in a large variety for the above.

Dealing first with electric time switches, the simplest model produced by the Horstmann Gear Co. Ltd. is their Type H, as illustrated herewith, which is arranged to extinguish automatically only, the tumbler switch being put on by hand at the desired time. The clock fitted to this model runs 15 days per winding, and the setting of the operating lever is very simple. Type H switches are obtainable in three sizes, viz., 10, 15, and 20 amperes.

For turning on and off automatically, the simplest model for indoor use is Type A/2, in which a tumbler switch is utilized for make and break. This is an advantage in that the wiring up of same is easily carried out by any competent electrician, no special knowledge or intelligence being necessary. A patented feature of Type A time switches is that the tumbler may be moved either on or off before the time set for the automatic movement without disturbing the normal sequence of operations; thus, supposing it were set to light at 5 p.m., and weather conditions rendered it advisable to light earlier, the shopkeeper could switch on the light by hand, and the clock would next make an *idle* move, extinguishing at the correct set time.

Electric Time Switch (Type H).



Controller for Window Lighting (Type A).

These on and off switches may be fitted with a selective device to prevent operation on Sunday.

For higher loads it is necessary to provide special make-and-break mechanism, and the Horstmann Gear Co. Ltd. have standardized the mercury pot-and-dipper system for loads up to 50 amperes on alternating current. In the 10-amp. size a special design of pot is used, which enables the time switch to be delivered by rail without fear of the mercury spilling. In these heavy-duty switches, clocks having a length of run up to 45 days may be fitted if desired.

Controllers for the operation of gas lamps in modern show-windows are now available in two popular forms. The Type 5 maintap Newbridge Controller, shown herewith, is largely used for controlling a group of lamps in conjunction with the various distant control devices, i.e., that manufactured by Messrs. W. Sugg & Co. Ltd., and is usually fitted in an easily accessible position inside the shop for winding, setting, etc. A shunt by-pass round the main cock allows sufficient gas to pass to keep the by-pass alight. This controller has the "Horstmann" patent slide, which permits the main cock to be opened before the set time without disturbing the subsequent normal sequence of operations. A selective device for cutting out

Sundays as mentioned in connection with electric time switches above, may also be embodied to order. A further useful controller for shop-window lighting is Type 14 for fitting immediately above the suspension lamp, when no distant control device is necessary. Again the selective device may be fitted, and in certain circumstances this Unit lamp controller will be found preferable to the group lighting model.

In conclusion, it should be emphasized that by means of clockwork mechanism practically any desired combination of movements may be achieved entirely automatically, the only limit being price, the manufacturers being naturally reluctant to manufacture new models which are not likely to have a ready sale, and which when produced in small numbers would be very expensive, and bear heavy overhead expenses.

London's Illuminated "White Line"

IN the construction and use of an illuminated "White Line" to guide traffic, an interesting innovation has recently been made, and one which may play an important part in the control of traffic in the future. An experimental line, illustrated below, is being tested at Hendon. The "White Line" has proved a useful innovation. The chief difficulty has been the tendency of the white marking to become obscured by the dirt of traffic, and on roads which are somewhat inadequately lighted it cannot always be clearly seen. The device now described represents an enterprising effort to overcome this difficulty.

The frame is of wrought iron, about 3½ inches wide by 5 inches deep; it is formed in three sections, and has a total length of about 30 feet. The top of the line forms a kind of frame in which pieces of laminated white marble and prism glass are placed alternately. A number of 220-volt, 40-watt Osram tubular lamps are

fitted at the bottom of the frame, which, when illuminated, produce the white line, visible to motorists at a distance of 200 yards. Results of tests have shown that the light is not decreased in intensity by motor headlights or street lamps.

The lamps, which are supplied with current from the mains, are switched on automatically at dusk, and extinguished at daybreak by an automatic time switch. The same device varies the lighting-up time to concur with the regulations in this regard.

Special precautions, it is interesting to note, are taken to protect the lamps from mechanical shocks caused by heavy traffic.

The inventor of the illuminated white line is Mr. R. F. Brown, Surveyor, Great Clacton, Essex; it was constructed by Messrs. Haywards Ltd., Borough, London, S.E.1, under the personal supervision of their Works Manager, Mr. P. B. Morton. The electrical work was carried out by the British Electrical Installation Co., 7, Lancaster Place, Strand, London, W.C.

Complete Change-over in Street Lighting of Santiago, Chile

FOR the first time in the history of electricity, a city has made a complete change-over in its street lighting system. It is interesting to note that the city of Santiago, Chile, has contracted for an entirely new lighting installation, and it is further interesting from a historical point of view to note that the change-over represents approximately fifty years of progress, i.e., the system which is now installed is similar to the systems used in this country about 1870, and the system which has just been contracted for will be the very latest in street lighting.

The contract has been under consideration for some time, during which careful study was given to the various systems of street lighting.

It is estimated that the lighting system when installed and ready for operation will represent an investment of several million dollars. The International General Electric Company Inc. will supply the transformer and control equipment, as well as the ornamental lighting units for the streets.

In view of the number of lights involved, their intensity and spacing, the city of Santiago will, when the entire installation is complete, be one of the best-lighted cities in the world.

Nine sub-stations will be employed, in which the transformers for the operation of the system will be installed. Each lighting unit will be operated from an individual series transformer, and each unit will be provided with a Holophane Dome Refractor, either of the symmetric or asymmetric type, depending upon the character of the streets where the units are installed. The plans call for 8,400 individual transformers. The equipment consists of the following:—

5,420 Bracket units, for the more sparsely settled area, secondary streets, and residential district.
1,400 Large-size pendant type lanterns.
4,100 Novalux pendant type lighting units.
56 Constant-current transformers.

No unit in any of the streets will carry lamps of less than 400 candle-power or 4,000 lumens, while the maximum candle-power runs up to 1,500 or 15,000 lumens.

3,935 Union Metal Manufacturing Co., single bracket arm standards.
370 Special Union Metal standards.
210 Union Metal Manufacturing Co., double bracket arm standards.

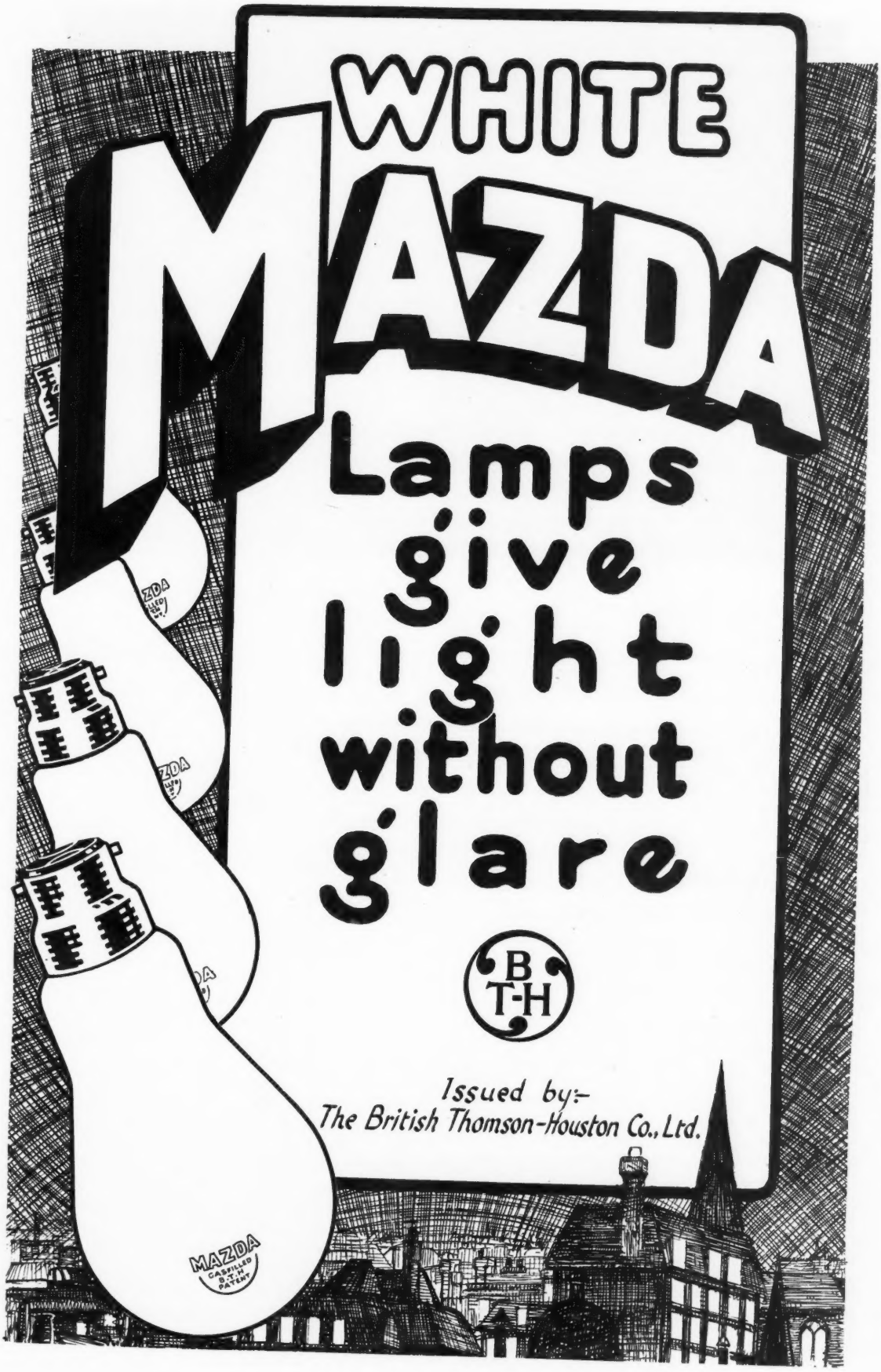
The Union Metal lighting standards will be both single and double arm, the latter to be installed in more congested areas, whereas the single-arm units will form a part of the secondary business streets and the more important residential areas.

The Cia Chilena de Electricidad Ltda., the local operating power company, has purchased this equipment through its purchasing agent in New York, Messrs. Carr Brothers Inc. The power company will undertake the work of construction, installing, and erecting of the system.

Vina del Mar, Chile's foremost and most exclusive summer resort, was the first lighting installation in Chile representing modern equipment. This was followed by installation at San Cristobol, Club Hipico, while the city of Santiago itself showed its faith in the General Electric Company's products by cabling for 200 units of Union Metal lighting standards, that they might be installed before the recent visit of the Prince of Wales to its city.

Santiago is Chile's capital and largest city, with an approximate population of 650,000 inhabitants, and will have a lighting zone which amounts to 36 square kilometres, and involves no less than 220 miles of cable.

The order for the 10,000 symmetric and asymmetric refractors has been placed by the International General Electric Company with Holophane Ltd., of London.


WHITE
MAZDA
Lamps give light without glare
B T-H
Issued by:-
The British Thomson-Houston Co., Ltd.
MAZDA

A Striking Illuminated Sign

The accompanying illustration, for which we are indebted to Benjamin Electric Ltd., is a view of the striking illuminated sign opposite King's Cross Railway Station, London, which was the subject of comment in a recent issue.

The main hoarding is 108 ft. wide by 30 ft. deep. The end portion (on the extreme right) measures 35 ft. wide by 30 ft. deep. For the main hoarding nine 200-watt gasfilled lamps in Benjamin elliptical angle reflectors are mounted along the top, and the same number of 200-watt lamps in Benjamin parabolic angle reflectors along the bottom. For the end portion three similar units at top and bottom are used.

The illustration gives a fair idea of the appearance of the placard, but it does not, of course, convey the colouring, on which the effectiveness of the sign largely depends. The effect is partly psychological, the tropical and brilliantly lighted scene making a remarkable contrast with the rather dingy and subdued surroundings in the Euston Road. The site is a good one, and the sign is prominently displayed.

Holophane Limited
Half-Yearly Conference

The usual half-yearly conference of the Indoor and Outdoor Staff of this Company was held at the offices in Elverton Street, Vincent Square, S.W.1, on the 29th and 30th ult.

In addition to the various matters discussed by the Staff, the conference had the benefit of hearing interesting and instructive papers read by gentlemen prominent in the illuminating engineering movement who are not connected with the firm. Amongst these special reference should be made to the following: Mr. Leon Gaster (Hon. Secretary of the Illuminating Engineering Society) on "A Review of Illuminating Engineering Progress during 1925"; Mr. L. L. Robinson (Borough Electrical Engineer of Hackney) in a bright and breezy talk on "Street Lighting"; Mr. W. E. Bush (of E.L.M.A.) on "The Policy of E.L.M.A. Lighting Service Bureau"; Mr. W. J. Jones (of E.L.M.A.) on "Shop-Window Lighting"; and Mr. Dudley Diggs (of the Street Lighting Department, International General Electric of Schenectady, U.S.A.) on "Some International Aspects of Street Lighting."

The various addresses contained much interesting information, and the account given by Mr. Diggs of the vast scale on which street lighting improvements are being initiated by local authorities in cities in the United States was most impressive. There was a good attendance, and the conference enabled those present to get a good general idea of recent developments in illuminating engineering.

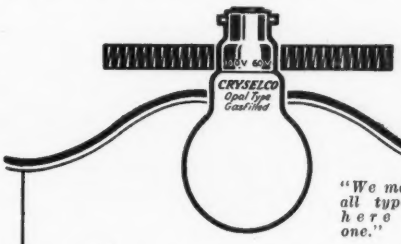
The "Niam" Illumination-Photometer

Through the courtesy of Messrs. G. Main et Cie (Paris) we have now received a specimen of the "Niam" illumination-photometer, described in our issue of November last (page 302). The instrument is very compact and self-contained and has several interesting features. We notice that the test surface (of the grease-spot type) is protected by a thin sheet of glass, which raises the question whether it is expedient to protect the photometric surface in this way. One would imagine that the polished surface of the glass would affect readings of illumination due to rays of light striking the surface somewhat obliquely, and that in some cases one might be troubled by direct reflections of lamps and globes in the glass. A useful novelty, which to some extent appears to overcome the last difficulty, is an ingenious little device to ensure the surface being always viewed at the same angle—a point of some consequence with grease spots and other photometric surfaces which are viewed by transmitted light. The instrument, by the way, is listed at only 170 francs. As the make-up includes battery, switch, rheostat and moving-coil voltmeter, this appears very moderate.

Personal Note

We understand that Mr. Justus Eck is retiring from the position of Director to the Photector Co. Ltd., as on December 31st, 1925.

Write to us for particulars and details of this regiment. Colonel Chris Elco will be happy to forward these, together with ammunition for all branches of your Publicity Service. FREE.



"We make all types: here is one."

Halt! 'Shun! Eyes Front!

Col. Chris Elco would not address you in this peremptory tone, but his Sergt.-Major, who believes in the Cryselco "Light" Brigade with the same absolute fervour as does his Colonel, would have no hesitation in thus calling your attention to **Cryselco Lamps.**

Both believe in the "units" under their command. They know that in attacking the powers of darkness in town, dwelling, mine, ship, etc., the boys of the Cryselco "Light" Brigade are irresistible. They share with the soldiers of His Majesty's Army two other likeable qualities—they are feared by the enemy—darkness—and loved by all their friends.

We can supply Radio Valves from Stock.
Send us your enquiries.

Telegrams: "Cryselco, Kempston." **CRYSELCO LTD., KEMPSTON WORKS, BEDFORD.** **Telephone: Bedford 177.**

HOME BRANCHES—

BRIGHTON, 35, Duke Street. (Telephone, Brighton 5512).
BIRMINGHAM, 21-22, Newspaper House, 164, Corporation Street (Telephone, Central 3741).
GLASGOW, 23, Douglas Street. (Telegrams, "Starter, Glasgow"; Telephone, Central 1253).
LONDON, Thanet House, 231-2, Strand, W.C.2. (Telegrams, "Cryselco Estrand, London"; Telephone, Central 3016-7-8).
NEWCASTLE-ON-TYNE, 27, Grey Street (Telegrams, "Cryselco, Newcastle-on-Tyne"; Telephone, Central 1286).
LEEDS, 11, New Station Street (Telegrams, "Cryselco, Leeds"; Telephone, Leeds 27866).
MANCHESTER, Douglas Chambers, 63, Corporation Street Telephone, City 9120).
CARDIFF, 30, Charles Street (Telephone, Cardiff 7466).

COL. CHRIS ELCO of the CRYSELCO "LIGHT" BRIGADE

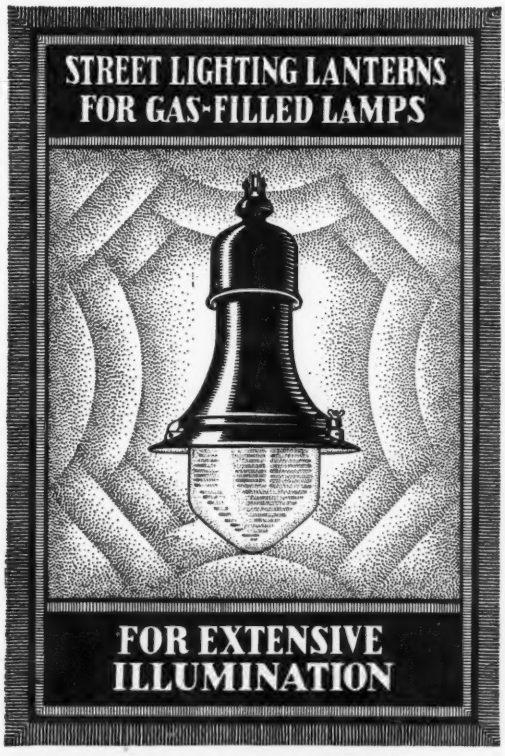
STREET LIGHTING and INDUSTRIAL LANTERNS

DESIGNED ON CORRECT PRINCIPLES.

CONSTRUCTED ON THE MOST PRACTICAL LINES.

ELEGANT IN APPEARANCE.

LOW IN PRICE.



GLASSWARE OF THE HIGHEST QUALITY, CORRECTLY SHAPED TO ENSURE THE BEST LIGHT DISTRIBUTION.

LAMPHOLDERS OF STRONG CONSTRUCTION.

PERFECT VENTILATION.

Please Note CHANGE OF ADDRESS:—

THE PHOTECTOR COMPANY LTD.

711-715 FULHAM ROAD, LONDON, S.W.6.

Stage Lighting at Drury Lane

Drury Lane Theatre, which was visited by the members of the Illuminating Engineering Society last year, has always been famous for its stage lighting, and the present performance of "Rose Marie" contains many examples of the appeal to the eye. The fantastic and now famous "Totem" dance is a case in point, and much use is made throughout the performance of special lighting effects. One of the most ingenious of these is the series of interludes arranged whilst the big scenes are being prepared—when the groups are shown round the camp-fire or a few players with only their faces strongly illuminated, and their figures dimly seen through a diaphanous screen.

Christmas Lighting at St. Martin-in-the-Fields

A reader draws our attention to the enterprising Christmas lighting adopted at the church of St. Martin-in-the-Fields. Under the portico was arranged a Christmas-tree decorated with miniature electric lamps, and the windows (of frosted glass) were flood-lighted with amber light from within, thus giving the church a very bright and cheerful appearance from the outside.

The adoption of this idea for showing off highly decorative windows also deserves attention. In many churches there are fine glass windows which few people get a chance of seeing during the daytime. Why not illuminate them from within by night, so that passers-by are attracted to the church and have an opportunity of examining these windows? In order to show the latter well, it would be necessary to provide some form of translucent diffusing surface inside the windows, as clear glass naturally cannot be revealed well by direct light; but this should not be very difficult to arrange.

Luminous Traffic Control in Piccadilly

In referring to Sir Henry Maybury's visit to the States we suggested the possibility that further experiments should shortly be made in London on the use of luminous signals for traffic control. We understand that the Ministry of Transport is now arranging for the placing of red and green signal lamps at the corners of side-streets leading into Piccadilly, and a police-officer is to be stationed in St. James's Street to control these signals. It is believed that the introduction of this device will bring about a material saving by releasing some of the police-officers engaged in traffic control.

Sheffield Illuminating Engineering Society

A very interesting lecture was delivered to the members of the Sheffield Illumination Society in the Montgomery Hall, Surrey Street, Sheffield, on the 21st January, 1926. The lecturer was Mr. J. M. Moorwood of Messrs. J. M. Moorwood, Ltd., Stevenson Road, Sheffield, the subject being "The Making of a Lamp Pillar."

In order to make the subject of general interest, Mr. Moorwood took a retrospect of the lighting of the city streets over the early part of last century, and particularly of the last 50 years.

The lecturer showed how the city had emerged from semi-darkness to one of the best-lighted cities in the provinces. First credit was given to Sheffield's late Chief Constable Jackson, who strongly advocated well-lighted streets, and who declared that one gas lamp was equal to two policemen.

The lecture was illustrated with lantern slides giving a descriptive method of the manufacture of pig iron in the blast furnaces, and showing a collection of native ores. Afterwards, passing on to the foundry, the cupola was described, and a series of sections and elevations were given with a number of light castings as examples, and finally a series of slides were shown explaining the method of moulding castings, and particularly lamp pillars.

An invitation was extended to the members to pay a visit to the works in the early part of the year when the whole process of melting and casting would be shown and fully explained.

Ultra-Violet Light as an Aid to Horticulture

THE experiences of Mr. Borlase Matthews in regard to the value of artificial light in horticulture (page 14), which appear to corroborate observations made in the United States, lead one to ask which is the region of the spectrum most effective for this purpose. Generally speaking, one would assume that a light broadly similar to that of the sun is desirable. So far as visible light is concerned, this is secured from most illuminants furnishing continuous spectra, but there remains the question of the effect of the ultra-violet light present in sunlight, which, though small in quantity, may be powerful in action. The rays of very short wavelength, which are found in certain special sources of artificial light, but are largely absorbed by the atmosphere, are of doubtful value. But it is believed that the intermediate ultra-violet region (extending to about 300$\mu\mu$) are highly beneficial; these are also the rays which appear most useful in medical treatment.

Many years ago travellers drew attention to the extraordinarily rapid progress of vegetation in the Arctic regions, once the sun has reached a fair altitude. This may be ascribed largely to the fact that daylight is continuous; but the presence of an unusually high ultra-violet content is also probably an influential factor. The same consideration may explain the very rapid growth of wheat in regions such as Alberta, where the whole process of sowing to harvesting has to be completed within five months, after which extremely cold winter soon sets in.

Another point which has been brought to our notice by a correspondent is the forwardness and strong growth of vegetables grown in certain hill-stations of India. It is stated that ordinary vegetables not only reach maturity in a period of three weeks as compared with 14 weeks on the plains, but are also much bigger and more robust. In fact, both vegetables and flowers reach dimensions scarcely ever attained in this country. The explanation offered for this phenomena is the clear mountain atmosphere and the undoubtedly greater proportion of ultra-violet light.

This leads to the conjecture whether the ordinary glass, as used in greenhouses, is not in many ways prejudicial to plants, and responsible for the familiar weakly constitution of many hothouse products. This is usually attributed to the high temperature and forcing process resulting in too rapid growth. But in favoured climates similar plants in the open may grow even quicker without becoming delicate, and it has therefore been suggested that the absorption of ultra-violet light by ordinary greenhouse glass may be the explanation. From this standpoint there seems room for experiment with such materials as the Lamplough Vitaglass, which has the additional merit, for this purpose, of partially diffusing the light.

Transmission of X-Ray Photographs by Wire

The transmission of photographs by wire has been effected with very fair success, but the telegraphing of X-ray photographs is, we believe, something new. There are many cases in which the interpretation of an X-ray photograph requires the services of an expert who may be many miles away. The telegraphing to him of the photograph may enable valuable advice to be quickly obtained. In complicated fractures or bone injuries quick diagnosis is particularly important. We hear that a negative showing the bone structure of a hand was recently sent from New York to Chicago in seven minutes. This method is likely to prove quite useful in the case of injuries occurring in remote places, where specialists are not available.

GOOD LIGHTING

TRANSFORMS THE HOME, THE BUSINESS AND THE FACTORY

THE HOME

Good lighting creates a clean and cheerful atmosphere: it makes work easier and rest pleasanter—it weaves itself effectively into the decoration and furnishing of the home—it is a protection against accidents and an insurance against undesirable visitors—it can be used economically anywhere—pantries, wardrobes, cupboards, as well as in living rooms—it can be obtained conveniently in a moment when wanted and dispensed with with equal facility when not wanted.

Electricity for Lighting

THE BUSINESS

Good Lighting is the Shopkeeper's cheapest and most effective advertisement; it attracts attention to displays, gives confidence, imparts an appearance of prosperity, creates demand, increases sales; it enables customers to choose their requirements with less delay and assistants to serve with greater speed. It promotes customer-satisfaction. For matching it can be more reliable than daylight or it can be obtained in a wide variety of attractive and attention-impelling colours.

Electricity for Lighting

THE FACTORY

Good Lighting increases production and direct profits; it decreases spoilage and prevents accidents; it reduces industrial fatigue and improves the healthiness and cheerfulness of the workers.

Electricity for Lighting

Ask your Local Electrical Undertaking or Registered Contractor to advise you concerning the latest methods of lighting your home, business and factory

or write to

THE BRITISH ELECTRICAL DEVELOPMENT ASSOCIATION
15, SAVOY STREET, STRAND, W.C.2

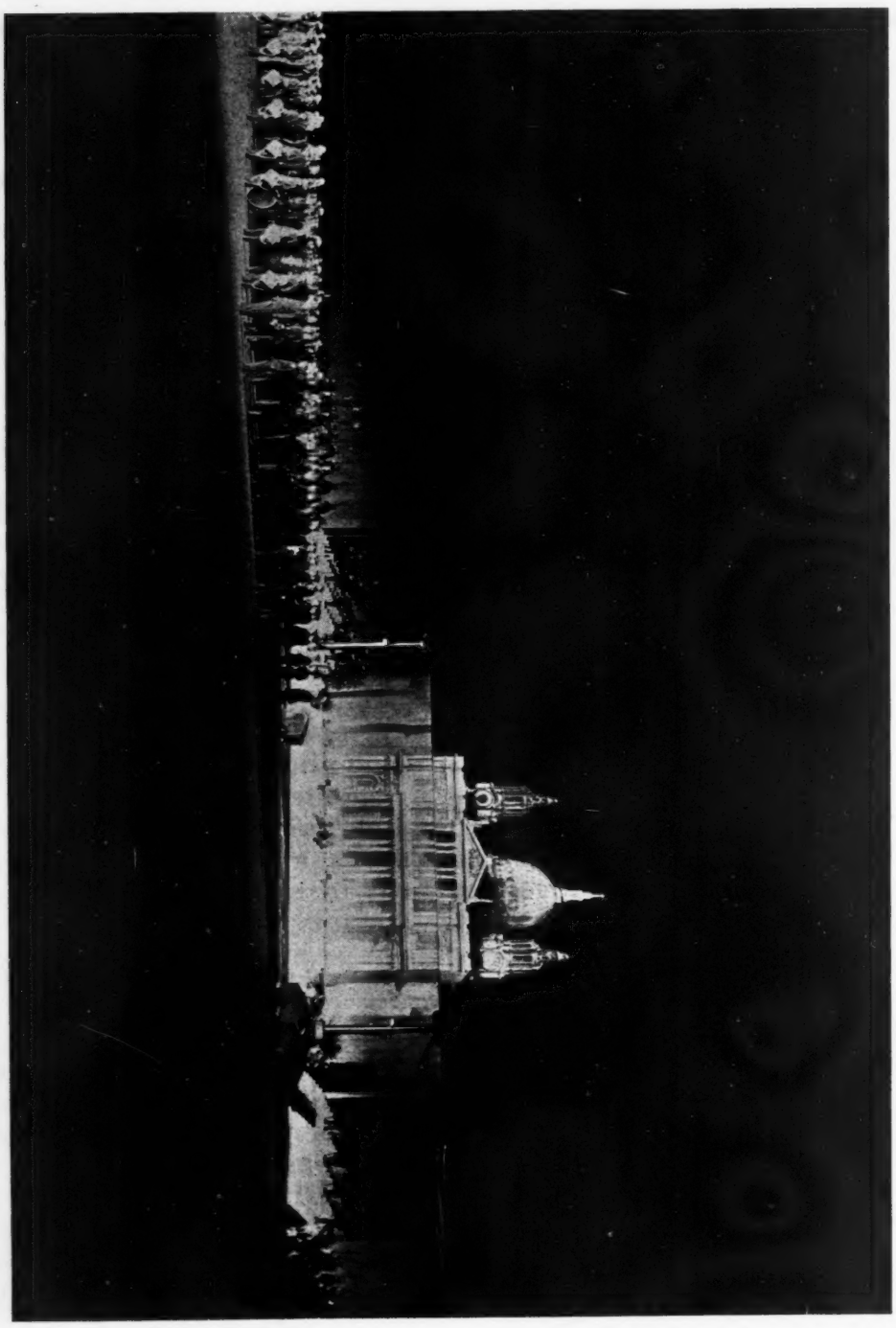


FIG. 1.—An untouched Photograph showing the effect of the projectors used in connection with the display, "London Defended," at the British Empire Exhibition, Wembley, last year. The Tattoo has been described as one of the most remarkable pieces of spectacular lighting undertaken during the year.

Flood-Lighting at the Military Tattoo, Wembley

For the above excellent photograph, showing the effect of the flood-lighting of the Military Tattoo at the British Empire Exhibition, we are indebted to the courtesy of the Strand Electric and Engineering Co. Ltd., to whose work in connection with spectacular lighting reference was recently made in these columns.

The carrying out by night of such a display in such a large space as the Stadium was rightly regarded as something of a feat, illustrating what can be done with modern flood-lighting appliances. The small illustration (Fig. 2) shows the application of one of the 12-in. Sunray lanterns, manufactured by this firm, to illuminate one of the concrete lions outside the British Government Pavilion. This was also the principal form of lantern used for the flood-lighting of scenery at the Tattoo, in each case 500-watt lamps being used. Only six spotting arcs were used for the long throws, all the short throws being carried out with projector gasfilled lamps in spotting lanterns of the 250, 500 and 1,000-watt types.

FIG. 2.—Flood-lighting outside the British Government Pavilion.

LAMPLOUGH RESTLIGHT ILLUMINATION

Rests the Eyes

WITH ORDINARY ILLUMINATION

MARCONI'S WIRELESS TELEGRAPH CO., LTD.
Telegraph Offices at Radio House, Wilson Street, E.C.2.
Taken with ORDINARY ELECTRIC LIGHT AND OPAL BOWLS
With 200 Watt Bulbs. *Time of Exposure, 1 minute*

Uncorrected Electric Light contains an excess of orange red rays.

In the LAMPLOUGH RESTLIGHT this excess is removed and a soft light, free from "glare," which mixes perfectly with natural daylight, is obtained—thus solving an outstanding and extremely difficult problem in illumination.

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LAMPLOUGH
RESTLIGHT BOWLS
Eliminate
GLARE AND EYESTRAIN,
Give a
SOFT WHITE LIGHT
and
ECONOMY IN CURRENT
CONSUMPTION

AFTER INSTALLING LAMPLOUGH RESTLIGHT

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TRADE NOTES & ANNOUNCEMENTS

ILLUMINATING GLASSWARE.

In these days, when so much is imported, it is encouraging to observe that there are still firms in this country producing a good range of illuminating glassware.

From Messrs. Ackroyd & Best (of Morley, Leeds), we receive a series of catalogues showing the wide variety of material produced. There are illuminated bowls, shades, etc., decorated with ceramic colours in varied designs, and there are many forms of diffusing glass described by various names ("Hail-opal," "Three Hailply," frosted, satin-finished, "Hailuxo," etc.)—all intended to soften and diffuse the light. Of these the "Hailopal" is, as the name suggests, a fine white or cream opal glass, and there are several other standard opalescent varieties of somewhat less density. The "Three Hailply" is a cased glass with a thin layer of opal between two layers of crystal glass (a special and difficult process, capable of gilding fine material for purposes of illumination). The inner layer may also be cream or any other tint, and the outer glasses may, if desired, be satin-finished. The "Hailuxo" is primarily a clear heat-resisting glass, specially suitable for miners' safety lamps. Coloured glassware is also a leading feature, many special tints, such as amber, orange, mauve, etc., being available. Pressed glass articles are made in great variety, in clear, opal, or coloured material. The firm also has a special department to deal with advertising glassware, using burnt-in colours, and is prepared to execute special designs.

Some of the illustrations show varied coloured patterns with a white ground, such as are now proving very popular; coloured designs on such diffusing glassware are vastly superior to the crude coloured shades of the past. Cut-glass bowls for overhead lighting are fully illustrated, and there are also some charming examples of decanters, finger bowls, goblets, etc., of the same material.

A comprehensive selection of Glassware Exhibits by Messrs. Ackroyd & Best Ltd. at Wembley Exhibition.

A LARGE ELECTRIC SIGN.

According to *The Electrical Review*, the new "Colgate" sign, recently erected on the south side of the Thames, is claimed to be the largest electric sign in England. It covers a vertical area of 5,000 square feet. A thermometer, which forms part of the design, is 60 feet high and 12 feet wide, and the large letters ("Colgate") are 12 feet 6 inches high, and each weighs about a quarter of a ton. The loading of the sign is approximately 100 kva., supply being received from the London Electric Supply Corporation at 2,500 volts, and transformed down to a working pressure of 105 volts. The control of the mechanism has also many interesting features. The sign was erected by the Borough Electric Signs, and the Cambridge Instrument Co. Ltd. was responsible for the design and installation of the temperature control apparatus.

COSMOS DOMESTIC APPLIANCES.

A new catalogue issued by Metro-Vick Supplies Ltd. shows the very wide range of domestic appliances served by electricity that are now being made. There are illustrations of electric kettles, irons, saucepans, cookers, washing machines, and radiators. There are also some things with an industrial application, such as soldering irons, blowers (for the removal of dust and grit in mines, textile mills, woodworking plants, etc.), suction and vacuum cleaners, and (for the convenience of hair-dressers) electric vibrators and hair driers. Yet another comparatively recent development is the provision of heating units for railway carriages, whilst the "Cosmos" auto-engine heater should be useful to many motorists during the cold winter spell.

K. F. M. ENGINEERING CO. LTD.

Change of Address.

On Thursday, December 31st, 1925, the address of the K. F. M. Engineering Co. Ltd. was altered to 29/31, Portugal Street, Kingsway, London, W.C.2.

EFFESCA LIGHTING APPLIANCES.

Recent catalogues emanating from Messrs. Falk, Stadelmann & Co. Ltd. cover a wide range. In the gas section the "Super UKAY" Lamp, available with superheater for shop fronts, street, and general outdoor lighting, figures prominently, and the electric-lighting catalogue contains all modern forms of globes, bowls and reflectors. Amongst the enclosed diffusing units the one with most originality is probably the "Halo-Lite," a two-piece globe with outer removable opal reflector. The design of the lower part, with the combined aim of providing an effective downward illumination with elimination of glare, deserves notice.

CONTRACTS CLOSED.

The following contracts are announced :—

Messrs. Siemens and English Electric Lamp Co. Ltd. :

London and North-Eastern Railway; for the supply of Siemens Train-lighting Lamps, vacuum type, during 12 months ending December, 1926.

Dublin United Tramways; for the supply of Siemens Traction Lamps for one year, from January 1st, 1926.

George Thompson & Co. Ltd. (Aberdeen Line); for the supply of Siemens Vacuum, Gasfilled and Carbon Lamps for their fleet, during 1926.

Booth Steamship Co. Ltd.; for the supply of all types of Siemens Vacuum and Gasfilled Lamps for one year ending December, 1926.

Metro-Vick Supplies Ltd. :

London and North-Eastern Railway: Chief Stores Superintendent, King's Cross Station; for part of Great Eastern Section L.N.E.R. Co.'s requirements for vacuum train lighting lamps during 12 months, January 1st to December 31st, 1926.

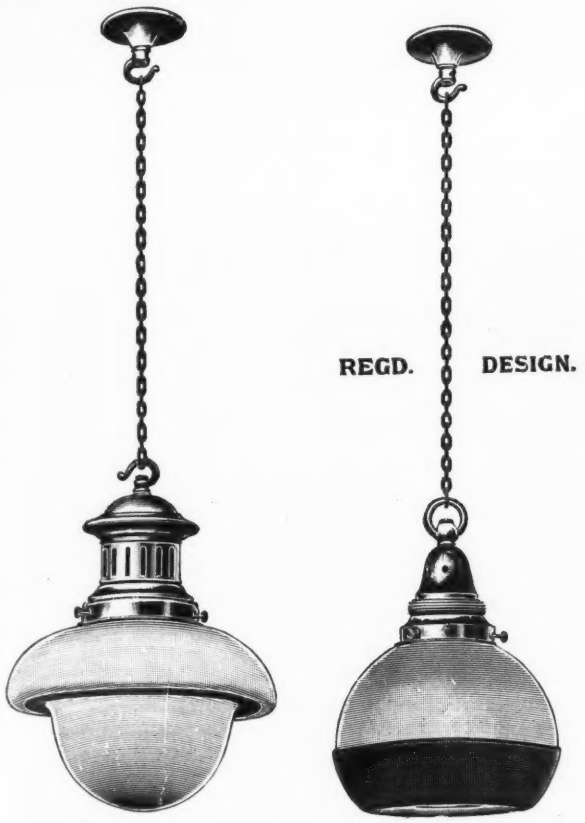
PHOTECTOR CO. LTD. NEW PREMISES.

As announced in our last issue, the Photector Co. Ltd. have moved to larger premises at 711-715, and we had recently an opportunity of inspecting the large space available for storing and packing. Some interesting forms of fittings are to be seen, those embodying the idea of an inner dioptric bowl with an outer globe of very finely satin-finished glass being specially striking. It is often urged against this form of outer covering that it is apt to collect dust; but this latest finish seems exceptionally smooth and unlikely to give trouble in this respect, as it can be easily cleaned. The diffusing effect, though slight, has a very material value when used with dioptric apparatus, giving a much softer light. Useful experience has been acquired recently in dockyard work, where fittings with large gasfilled lamps are being installed; an important feature in lighting these open spaces is the provision of a relatively high illumination at points a considerable distance away from the source, and the latest forms of dioptric apparatus seem to have proved very successful in this respect.

Further " Dia " long-burning flame arcs are being installed, and in some cases their behaviour on voltages which fluctuate considerably has been very encouraging.

LIGHTING EFFECTS AT E.L.M.A. LUNCH.

Particular attention was paid to the lighting effects at the E.L.M.A. New Year's Day luncheon at Simpson's Restaurant in the Strand. G.E.C. Spotlights were installed on two of the walls, and Osram Decoration Lamps were festooned across the room. Modern lighting effects, and the old pictures which were hung round the Knight's Room, formed a somewhat striking contrast.

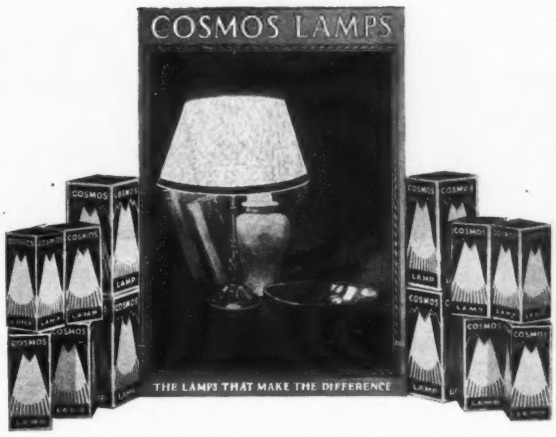


The " Lunalite." The " Halo-Lite."

Two illustrations of attractive fittings in Messrs. Falk, Stadelmann and Co.'s catalogue.

ALLEN-LIVERSIDGE LTD.—EXPANSION IN INDIA.

Allen-Liversidge Ltd. inform us that they have just registered a Company in Bombay under the name of " Allen-Liversidge (India) Ltd.," for the purpose of carrying on, in India, their business of dissolved acetylene manufacturers, carbide merchants, and lighting and heating engineers.



DISPLAY FOR COSMOS LAMPS.

Above is a picture of a display for Cosmos Lamps, designed to enable the trade to keep their windows bright and attractive after the Christmas window-dressing is finished.

The design is printed in eleven colours and in gold, with the lamp-shade in red batik, and the illumination, whilst rendering this a very striking display after dark, is also sufficient to attract attention during the daytime.

A SPECIAL LIGHTING INSTALLATION.

A special and interesting lighting installation has recently been completed at the well-known stores of Messrs. A. W. Gamage Ltd., Holborn; this installation comprises a number of special Gecoray reflectors, which, with 60-watt Osram gasfilled lamps, have been fitted to illuminate the arcade and island windows. The special feature of this installation is a departure from fitting ordinary Gecoray angle reflectors. The reason for this is that, since the windows are very low, and their interiors can be viewed from various angles, it was feared that possibly some of the angle units would be in the line of vision, and so cause discomfort to persons viewing the goods displayed.

To obviate this a number of special Gecoray reflectors have been installed. These are much smaller than the ordinary type of Gecoray reflector, and are recessed in the ceiling so that the edges, which are flush with the surface, are covered with a neat metal-moulded ring.

This system has proved to be very effective; the illumination on the goods is most even and very well diffused. It is remarkable that although each reflector can be clearly seen, as our illustration shows, glare is entirely absent. With this system of illumination it is a simple matter to introduce colour-lighting effect if desired. The experience gained in this case is interesting in view of the difficulty of avoiding exposure of lights in certain forms of windows, viewed from a number of different directions. This question is apt to arise in a somewhat acute form in the case of so-called " island windows," which may be completely surrounded by a crowd of spectators.

The installation was designed by the Illuminating Engineering Department of The General Electric Co. Ltd., and the work was carried out by Messrs. A. W. Gamage's own electrical staff.

DEGREE OF ILLUMINATION AND WORKING SPEED.

Dear Mr. Gaster,—I have been reading with interest the recent numbers of GOOD LIGHTING and wish to congratulate you upon the progress which your journal has made. Incidentally, I noted on page 319 of the November 1925 issue a letter signed by A. Cunnington. He places a good deal of stress upon the knee of the curve in one of Dr. Ives's papers. I do not recall what terms are being plotted against each other, but apparently Mr. Cunnington draws the conclusion that after 10 foot-candles are reached, the curve flattens out or does not continue to rise appreciably.

We find that curves relating visual phenomena with foot-candles or brightness of the background are commonly approximately logarithmic; therefore, the knee of the curve will be found to vary in position depending upon the range for which the data are plotted. If a curve is strictly logarithmic its shape will be identical for a number of ranges of foot-candles.

I do not wish to take up valuable space by going into details but merely take this opportunity to bring to the attention of Mr. Cunnington and others this common error of interpreting curves of this character. I brought out this point clearly in one of my recent books ("Light and Work," Chapter xiii), and also throughout the book I have plotted two scales of foot-candles for surfaces of adding reflection-factors, respectively 8 per cent and 80 per cent. I think I prove conclusively with data and by emphasizing a proper interpretation of these curves that in some cases we need not expect to find vision ceasing to improve even up to 1000 or more foot-candles.

I am sorry that space does not permit going into detail but perhaps readers will be interested in the reference given. It is surprising to me how common these errors of interpretation of curves are among lighting practitioners.

Yours very truly,

M. LUCKIESH

(Director, Lighting Research Laboratory, National Lamp Works of General Electric Co., Nela Park, Cleveland, Ohio),

President, Illuminating Engineering Society.

[We are very glad to receive this communication from Mr. Luckiesh, whose researches in many fields of illuminating engineering are well known to our readers. One interesting conclusion arising from Dr. Ives's recent paper was that the curve is apparently not invariably logarithmic, and the relation between intensity of illumination and efficiency of work is probably different according to the nature of the process. The views expressed illustrate the need for further researches on various industrial and clerical operations and the difficulty of drawing any very rigid conclusion applying to all.—ED.]

THE HOLOPHANE LUMETER

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For the measurement of Illumination, Candle Power and Surface Brightness, etc.

A new model of the Holophane Lumeter is now available. The apparatus is self-contained and consists of the Lumeter proper, non-spillable Accumulator, detachable leads and Standard Celluloid surface. The whole is supplied in a convenient leather carrying case fitted with a Voltmeter and variable resistance to enable the standard lamp in the instrument to be run at exactly the correct voltage.

Alternatively the instrument can be supplied complete with accumulator and leather carrying case, but without the voltmeter and variable resistance.

Either equipment can be carried about as easily as a small camera.

The primary use of the instrument is for the measurement of illumination of the interiors, streets and lighting installations of all kinds. The Lumeter may also be used to measure surface brightness, candle power, absorption of glasses or solutions, reflective properties of surfaces, etc.

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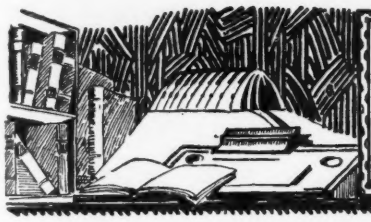

REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED

STAGE-LIGHTING FOR "LITTLE" THEATRES, *by C. Harold Ridge, A.R.S.M., D.I.C., etc., with an Introduction by Terence Gray and a Foreword by Basil Dean; illustrated. Heffers & Sons, Cambridge, 5s. net; pp. 79; figs. 22.*

The art of dramatic lighting is alike in the "Little" Theatre and in the display window of the store, the difference being that in one ideas are lighted in action, and in the other immobile goods are lighted.

Therefore any practical discussion of the underlying principles is always of interest, and although Mr. Ridge writes with a view to helping these small producers who are not overburdened with funds, much that he has to say will be of interest to those working in larger concerns. The number of these amateur and semi-amateur theatres tends to increase. In the United States the respectable total of over 3,000 has been attained, and we may certainly expect, in the next decade, to see at least one in every English town of any size.

The treatment of technical matters in this volume is very simple and straightforward, and is confined to affairs of immediate and practical interest. The author deals with wiring and switchboards, the use of dimmers, etc., and discusses the principles of stage lighting, together with various items of lighting equipment and the methods of scenic presentation, in a useful manner.

We believe that there is a possibility of development for makers of apparatus useful on the stage, for simple outfits, both for sale and hire, especially if a competent man can be sent in charge, at inclusive figures, for fitting or manipulating as required.

Meanwhile such useful books as this are to be welcomed, since they reflect the interest of the producer as artist in the technical necessities of his stage, in which none is more important than lighting. W. G. R.

PHYSICS IN INDUSTRY, *Lectures delivered before the Institute of Physics by J. W. Mellor, A. E. Oxley, and C. H. Desch, with a Foreword by the Hon. Sir Charles A. Parsons. (Oxford University Press, London, 1924; pp. 48, 3s. net.)*

In a preface to this little volume an extract from the Presidential Address given by the Hon. Sir Charles A. Parsons before the Institute is reproduced. In this the value of the physicist to modern industry is illustrated by many striking examples. The three lectures deal respectively with "Applications of Physics to the Ceramic Industries," "The Physicist in the Textile Industries," and "The Physicist in Metallurgy." In the first lecture a number of instances of applications of light are mentioned; artificial daylight is now proving useful for the study of delicate glazes and surface colours, and the author describes some pioneering experiments with daylight glasses made during the war. There are other applications of magnetism and X-rays, and of course scores of problems are involved in the firing which afford a fine field for the efforts of the physicist. The next lecture, dealing with the textile industries, is illustrated by microphotographs and diagrams showing the nature of the material and methods of testing the uniformity and strength of fibre. Here again we are concerned with light; a special photometer designed to measure the reflecting power of threads was used to prove that the lustre of doubled yarn depends on the position of the fibres from which it is spun. In the final lecture, dealing with metallurgy, it is again shown that the art of the smith and tool-hardener depended on accurate observation of molten material in a darkened workshop, and his skill is only imperfectly replaced by the optical pyrometer. X-rays and polarized light also play a useful part in the study of metal-structure. Recent studies of atomic and crystalline structure may have important results in the future. The three lectures are written in a scholarly and lucid manner and make interesting reading.

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The Journal of

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SPECIAL INFORMATION.

THE ILLUMINATING ENGINEER (the Journal of GOOD LIGHTING) was founded in January, 1908, and has thus been in existence for eighteen years.

SINCE the year 1909, when the Illuminating Engineering Society was founded in London, it has been the official organ of the Society.

IT is *the only journal in this country exclusively devoted to Lighting by all Illuminants.*

IT receives the assistance of contributors who are leading experts on illumination in this country and abroad. Foreign Notes and News will be a speciality, and correspondents have been appointed in all the chief cities of the world.

THE Journal contains *first-hand and authoritative information on all aspects of lighting;* it has also been improved and extended by the inclusion of a *Popular and Trade Section* containing special articles of interest to contractors, gas and electric supply companies, Government Departments and members of the Public.

DISCUSSIONS before the Illuminating Engineering Society which are reproduced in this Journal are participated in alike by experts on illumination and *users of light*, whose co-operation is specially invited.

Good Lighting is of interest to everyone. The Journal is read by engineers, architects, medical men, factory inspectors, managers of factories, educational authorities, public lighting authorities, and large users of light of all kinds.

BESIDES being issued to all members of the Illuminating Engineering Society, the Journal has an independent circulation amongst people interested in lighting in all parts of the world. The new and extended form of the Journal should result in a continual and rapid increase in circulation.

Every reader of THE ILLUMINATING ENGINEER, the Journal of GOOD LIGHTING, *is interested in illumination, and is a possible purchaser of lamps and lighting appliances. Gas and Electricity Supply Undertakings likewise benefit by the movement for Better Lighting, with which the Journal is associated, and which stimulates the demand for all illuminants.*

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The Society preserves an impartial platform for the discussion of all illuminants, and invites the co-operation both of experts on illumination and users of light; it includes amongst its members manufacturers, representatives of gas and electric supply companies, architects, medical men, factory inspectors, municipal officers, and many others interested in the use of light in the service of mankind.

The Centre for Information on Illumination.

For particulars apply to:

L. GASTER, *Hon. Secretary*, 32, Victoria Street, LONDON, S.W. 1.